INCH-POUND
MIL-M-38510/108A
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SUPERSEDING
MIL-M-38510/108 (USAF)
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MILITARY SPECIFICATION

MICROCIRCUITS, LINEAR, TRANSISTOR ARRAYS, MONOLITHIC SILICON

This specification is approved for use by all Departments and Agencies of the Department of Defense.

Inactive for new design as of 10 July 1995

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF 38535

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon transistor arrays. Two product assurance classes and a choice of case outlines and lead finishes are provided and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3)

1.2 Part or Identifying Number (PIN). The PIN should be in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types should be as follows:

Device type	Circuit
01	Two isolated NPN transistors and one NPN Darlington connected pair, general purpose.
02	Three isolated NPN transistors and one NPN differentially connected pair, general purpose.

1.2.2 Device class. The device class should be the product assurance level as defined in MIL-PRF-38535.

1.2.3 Case outline. The case outline should be as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
A 1/	GDFP5-F14 or CDFP6-F14	14	Flat pack
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	Flat pack
M	MACY1-X12	12	Can

1/ Inactive package case outline.

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, 3990 East Broad St., Columbus, OH 43216-5000, or emailed to bipolar@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

AMSC N/A FSC 5962

1.3 Absolute maximum ratings. 1/

Collector – base voltage	40 V dc 2/
Collector – emitter voltage	15 V dc 2/
Collector – substrate voltage	60 V dc 3/
Emitter – base voltage	5 V dc 2/
Power dissipation	300 mW 2/
Collector current	50 mA 2/
Storage temperature range	-65°C to +150°C
Junction temperature	+175°C
Lead temperature (soldering, 60 seconds)	+300°C

1.4 Recommended operating conditions.

Collector – base voltage	32 V dc 2/
Collector – emitter voltage	12 V dc 2/
Ambient operating temperature range	$-55°C \le T_A \le +125°C$

1.5 Power and thermal characteristics.

Case outline	Maximum allowable power dissipation	Maximum θ_{JC}	Maximum θ_{JA}
A, D, M	350 mW @ T_A = 125°C	60°C/W	140°C/W
C	400 mW @ T_A = 125°C	40°C/W	120°C/W

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard for Microelectronics.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

(Copies of these documents are available online at http://assist.daps.dla.mil;quicksearch/ or www.dodssp.daps.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein the text of this document shall takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

1/ The collector of each transistor is isolated from the substrate by an integral diode. The substrate must be connected to the most negative point in the external circuit to maintain isolation between transistors and to provide for normal transistor action.
2/ Rating applies to each transistor within the array.
3/ Does not apply to Q_5 of device type 02, refer to V_{CEO} rating.

3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.4).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein. This slash sheet has been modified to allow the manufacturer to use the alternate die/fabrication requirements of paragraph A.3.2.2 of MIL-PRF-38535 or other alternative approved by the Qualifying Activity.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 Circuit diagrams and terminal connections. The logic diagram and terminal connections shall be as specified on figure 1.

3.3.2 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity (DSCC-VA) upon request.

3.3.4 Case outlines. The case outlines shall be as specified in 1.2.3.

3.4 Lead material and finish. The lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended ambient operating temperature range, unless otherwise specified.

3.6 Electrical test requirements. Electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

3.7.1 Certification/compliance mark. The certification mark for device classes Q and V shall be a “QML” or “Q” as required in MIL-PRF-38535. For class Q product built in accordance with A.3.2.2 of MIL-PRF-38535 or other alternative approved by the Qualifying Activity, the “QD” certification mark shall be used in place of the “QML” or “Q” certification mark.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 53 (see MIL-PRF-38535, appendix A).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions	Temperature range	Device type	Limits 1/		Unit
					Min	Max	
Breakdown voltage, collector to base	$V_{(BR)CBO}$	I_C = 10 µA, I_E = 0	-55°C ≤ T_A ≤ +125°C	01, 02	40		V
Breakdown voltage, collector to emitter	$V_{(BR)CEO}$	I_C = 1 mA, I_B = 0	-55°C ≤ T_A ≤ +125°C	01, 02	15		V
Breakdown voltage, collector to substrate 2/	$V_{(BR)CUO}$	I_C = 10 µA	-55°C ≤ T_A ≤ +125°C	01, 02	60		V
Breakdown voltage, emitter to base 2/	$V_{(BR)EBO}$	I_E = 10 µA, I_C = 0	-55°C ≤ T_A ≤ +125°C	01, 02	5.0		V
Collector to base cutoff current	I_{CBO}	V_{CB} = 35 V, I_E = 0	-55°C ≤ T_A ≤ +25°C	01, 02		10	nA
			T_A = +125°C			0.2	µA
Collector to emitter cutoff current	I_{CEO}	V_{CE} = 10 V, I_B = 0	-55°C ≤ T_A ≤ +25°C	01, 02		10	nA
			T_A = +125°C			1.0	µA
Collector to emitter cutoff current (Darlington pair) 3/	$I_{CEO(D)}$	V_{CE} = 10 V, I_B = 0	-55°C ≤ T_A ≤ +25°C	01		20	nA
			T_A = +125°C			50	µA
Collector to substrate cutoff current 2/	I_{CUO}	V_{CU} = 40 V	-55°C ≤ T_A ≤ +25°C	01, 02		10	nA
			T_A = +125°C			200	
Emitter to base cutoff current	I_{EBO}	V_{EB} = 4 V, I_C = 0	-55°C ≤ T_A ≤ +25°C	01, 02		10	nA
			T_A = +125°C			200	
Collector to emitter voltage (saturated)	$V_{CE(sat)}$	I_C = 10 mA, I_B = 1 mA	-55°C ≤ T_A ≤ +25°C	01, 02		0.400	V
			T_A = +125°C			0.600	
Base emitter voltage (saturated)	$V_{BE(sat)}$	I_C = 10 mA, I_B = 1 mA	+25°C ≤ T_A ≤ +125°C	01, 02		1.0	V
			T_A = -55°C			1.1	
Base emitter voltage (unsaturated)	V_{BE}	V_{CE} = 3 V, I_E = -1 mA	T_A = +25°C	01, 02	0.600	0.800	V
			T_A = +125°C		0.450	0.650	
			T_A = -55°C		0.750	0.950	
Base emitter voltage (unsaturated)	V_{BE}	V_{CE} = 3 V, I_E = -10 mA	T_A = +25°C	01, 02		0.900	V
			T_A = +125°C			0.750	
			T_A = -55°C			1.000	
Base emitter voltage (unsaturated), Darlington pair 3/	$V_{BE(D)}$	V_{CE} = 3 V, I_E = -1 mA	T_A = +25°C	01	1.100	1.500	V
			T_A = +125°C		0.700	1.100	
			T_A = -55°C		1.500	1.900	
Base emitter voltage (unsaturated), Darlington pair 3/	$V_{BE(D)}$	V_{CE} = 3 V, I_E = -10 mA	T_A = +25°C	01		1.600	V
			T_A = +125°C			1.200	
			T_A = -55°C			2.00	
Input offset voltage, differential pair 4/	$\lvert V_{BEQ1} - V_{BEQ2} \rvert$	V_{CE} = 3 V, I_E = -1 mA	T_A = +25°C	01, 02		2.0	mV
			-55°C ≤ T_A ≤ +125°C			3.0	
Input offset voltage for pairs of isolated transistors 5/ 6/ 7/	$\lvert V_{BEQA} - V_{BEQB} \rvert$	V_{CE} = 3 V, I_E = -1 mA	T_A = +25°C	01, 02		2.0	mV
			-55°C ≤ T_A ≤ +125°C			3.0	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions	Temperature range	Device type	Limits 1/		Unit
					Min	Max	
Temperature coefficient of base emitter voltage 5/ 8/	$\Delta V_{BE}/\Delta T$	V_{CE} = 3 V, I_E = -1 mA	-55°C ≤ T_A ≤ +25°C	01	-2.2	-1.5	mV/°C
				02	-2.2	-1.3	
			+25°C ≤ T_A ≤ +125°C	01	-2.2	-1.5	
				02	-2.2	-1.3	
Temperature coefficient of base emitter voltage, Darlington pair 3/ 8/	$\Delta V_{BE(D)}/\Delta T$	V_{CE} = 3 V, I_E = -1 mA	-55°C ≤ T_A ≤ +25°C	01	-5.0	-3.5	mV/°C
			+25°C ≤ T_A ≤ +125°C		-5.0	-3.5	
Temperature coefficient of input offset voltage 5/ 9/	$(\Delta\lvert V_{BEQA} - V_{BEQB}\rvert)/\Delta T$	V_{CE} = 3 V, I_E = -1 mA	-55°C ≤ T_A ≤ +25°C	01, 02		15	µV/°C
			+25°C ≤ T_A ≤ +125°C			15	
Static forward current transfer ratio (beta)	h_{FE}	V_{CE} = 3 V, I_C = 10 µA	+25°C ≤ T_A ≤ +125°C	01, 02	45		
			T_A = -55°C		25		
Static forward current transfer ratio (beta)	h_{FE}	V_{CE} = 3 V, I_C = 1 mA	+25°C ≤ T_A ≤ +125°C	01	70	300	
			T_A = -55°C		40		
			+25°C ≤ T_A ≤ +125°C	02	70		
			T_A = -55°C		40		
Static forward current transfer ratio (beta)	h_{FE}	V_{CE} = 3 V, I_C = 10 mA	+25°C ≤ T_A ≤ +125°C	01, 02	60		
			T_A = -55°C		35		
Magnitude of static beta ratio for any two isolated transistors 5/ 6/ 7/	h_{FEQA}/h_{FEQB}	V_{CE} = 3 V, I_C = 1 mA	T_A = +25°C	01, 02	0.9	1.1	
			-55°C ≤ T_A ≤ +125°C		0.85	1.15	
Static forward current transfer ratio, Darlington pair 3/	$h_{FE(D)}$	V_{CE} = 3 V, I_C = 1 mA	+25°C ≤ T_A ≤ +125°C	01	4000		
			T_A = -55°C		2500		
Static forward current transfer ratio, Darlington pair 3/	$h_{FE(D)}$	V_{CE} = 3 V, I_C = 100 µA	+25°C ≤ T_A ≤ +125°C	01	2500		
			T_A = -55°C		1500		
Low frequency, small signal, forward current transfer ratio	h_{fe}	V_{CE} = 3 V, I_C = 1 mA	T_A = -55°C	01, 02	35		
			+25°C ≤ T_A ≤ +125°C		60		
Gain-bandwidth product	f_t	See figure 4	T_A = +25°C	01, 02	300		MHz
Delay time	t_d	See figure 2	T_A = +25°C	01, 02		100	ns
			T_A = -55°C, +125°C			160	
Rise time	t_r	See figure 2	T_A = +25°C	01, 02		50	ns
			T_A = -55°C, +125°C			80	
Storage time	t_s	See figure 2	T_A = +25°C	01, 02		200	ns
			T_A = -55°C, +125°C			300	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions	Temperature range	Device type	Limits 1/		Unit
					Min	Max	
Fall time	t_f	See figure 2	T_A = +25°C	01, 02		80	ns
			T_A = -55°C, +125°C			125	
Channel separation	C.S.	See figure 3	T_A = +25°C	01, 02	80		dB

1/ Limits apply to each transistor within the array, unless otherwise specified.
2/ Does not apply to Q_5 of device type 02.
3/ Applies only to Darlington pair (Q_3, Q_4) of device type 01.
4/ Applies only to differential pair (Q_1, Q_2) of device type 02.
5/ Does not apply to Darlington pair (Q_3, Q_4) of device type 01.
6/ Does not apply to differential pair (Q_1, Q_2) of device type 02.
7/ Applies for pairs (Q_1, Q_2) of device type 01 and for pairs (Q_1, Q_3), (Q_1, Q_4), (Q_1, Q_5) of device type 02.
8/ (V_{BE} @ 125°C – V_{BE} @ 25°C)/(125°C - 25°C), (V_{BE} @ 25°C – V_{BE} @ -55°C)/(25°C – (-55°C))
9/ ($\left|\right.|V_{BEQA} - V_{BEQB}|$ @ 125°C - $|V_{BEQA} - V_{BEQB}|$ @ 25°C$\left.\right|$)/(125°C - 25°C),
($\left|\right.|V_{BEQA} - V_{BEQB}|$ @ 25°C - $|V_{BEQA} - V_{BEQB}|$ @ -55°C$\left.\right|$)/(25°C – (-55°C))

TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters	1	1
Final electrical test parameters	1*, (2, 3, 4)**	1*, (2, 3, 4)**
Group A test requirements	1,2,3,4,5,6 7,9,10,11	1, 2, 3, 4
Group B electrical test parameters when using the method 5005 QCI option	1,2,3 and table IV delta limits	N/A
Group C end-point electrical parameters	1,2,3 and table IV delta limits	1,2,3 and table IV delta limits
Group D end-point electrical parameters	1,2,3	1,2,3

*PDA applies to subgroup 1
** $\Delta V_{BE}/\Delta T$ and $(\Delta|V_{BEQA} - V_{BEQB}|)/\Delta T$ test as specified in table III herein for group A, subgroups 2 and 3, and f_t tests as specified in table III herein for group A, subgroup 4, are not required for final electrical tests (for device 02 only) but shall be performed for group A sample testing.

4. VERIFICATION.

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not effect the form, fit, or function as function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

a. The burn-in test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

b. Burn-in test (method 1015 of MIL-STD-883) 1/.

Test condition	B		A 2/	
Product assurance class	S	B	S	B
T_A minimum	125°C	125°C	250°C	200°C
t minimum	240 hours	168 hours	16 hours or 200°C 168 hours	16 hours

Notes:

1/ The vertical columns of this table establish alternate combinations of test conditions from which the manufacturer may choose any one for a given product assurance class, at their option, unless otherwise specified in the procurement documentation. The same condition shall be used for all devices in a given inspection lot and the same condition shall be used for both burn-in (when applicable), and operating life test for any given inspection lot. Alternate 2 for stabilization bake and high temperature storage tests shall be used only when test condition A has been selected, and alternate 1 shall be used when test condition B has been selected.

2/ When accelerated test condition A is used, the centrifuge test and hermeticity tests of method 5004 of MIL-STD-883 shall be performed, in that order, subsequent to the burn-in test and before the final electrical test of method 5004 of MIL-STD-883.

c. Reverse bias burn-in (method 1015 of MIL-STD-883). This screen shall apply to class S only.

Test condition	A
Product assurance class	S
T_A minimum	150°C
t minimum	72 hours

d. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.

e. Additional screening for space level product shall be as specified in MIL-PRF-38535.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

4.4 Technology Conformance inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroup 8 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of MIL-PRF-38535.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

a. End point electrical parameters shall be as specified in table II herein.

b. The steady-state life test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

c. Operating life test (method 1005 of MIL-STD-883) 1/.

Test condition	B		A 2/	
Product assurance class	S	B	S	B
T_A minimum	125°C	125°C	250°C	200°C
t minimum	1000 hours	1000 hours	100 hours or 200°C 1000 hours	100 hours
Sample size series number	5	5	10	10

Note:
1/ The vertical columns of this table establish alternate combinations of test conditions from which the manufacturer may choose any one for a given product class, at their option, unless otherwise specified in the procurement documentation.
2/ See 4.2b.

d. Steady state reverse bias (method 1005 of MIL-STD-883).

Test condition	A
Product assurance class	S
T_A minimum	150°C
t minimum	72 hours
Sample size series number	5

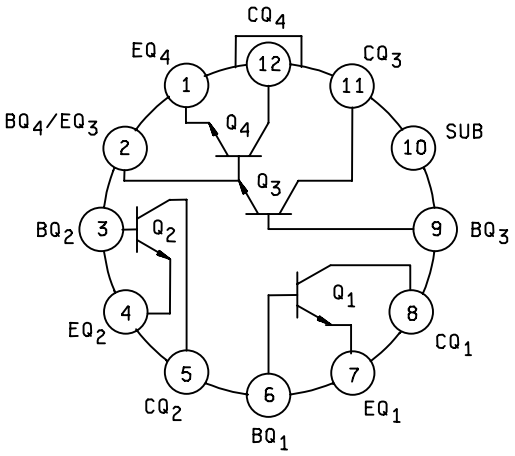
4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End point electrical parameters shall be as specified in table II herein.

4.5 Methods of inspection. Methods of inspection shall be specified as follows.

4.5.1 Voltage and current. All voltage values given are referenced to the microcircuit ground terminals. Currents given are conventional current and positive when flowing into the referenced terminal.

Device type 01

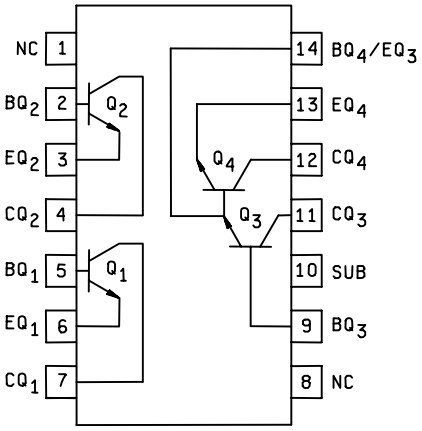
Case M



12 lead can (top view)

Device type 01

Cases A, C, D

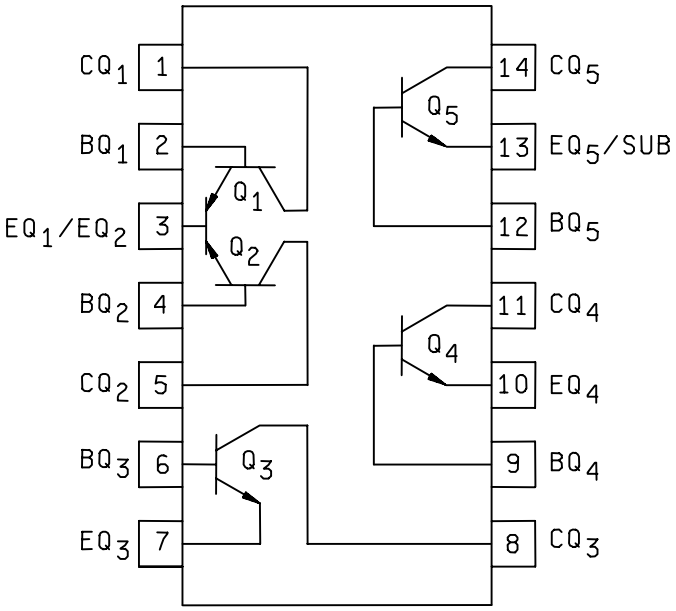


14 lead flat pack or dual-in-line (top view)

Figure 1. Circuit diagrams and terminal connections.

Device type 02

Cases A, C, D



14 lead flat pack or dual-in-line (top view)

Figure 1. Circuit diagrams and terminal connections – Continued.

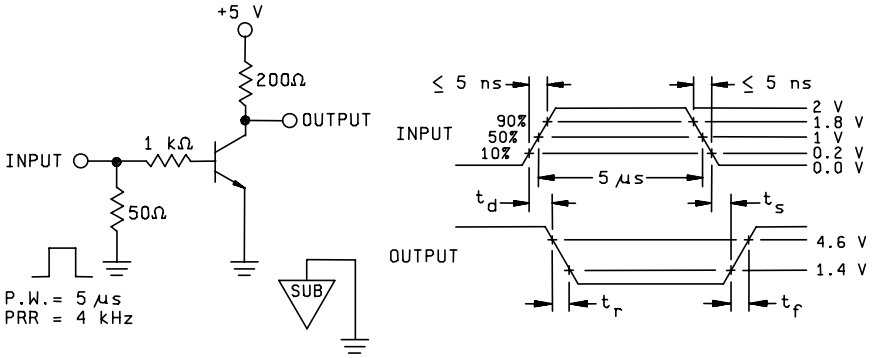
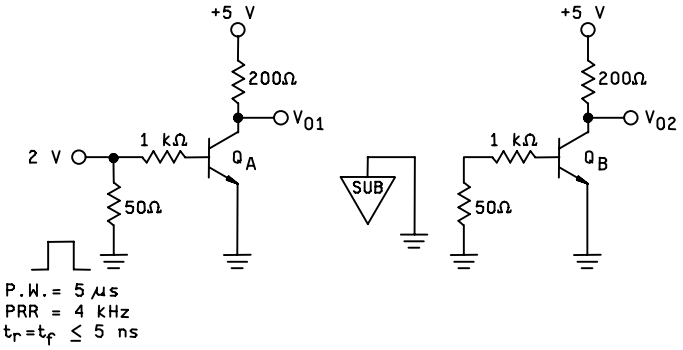


FIGURE 2. Switching time test circuit and waveforms.



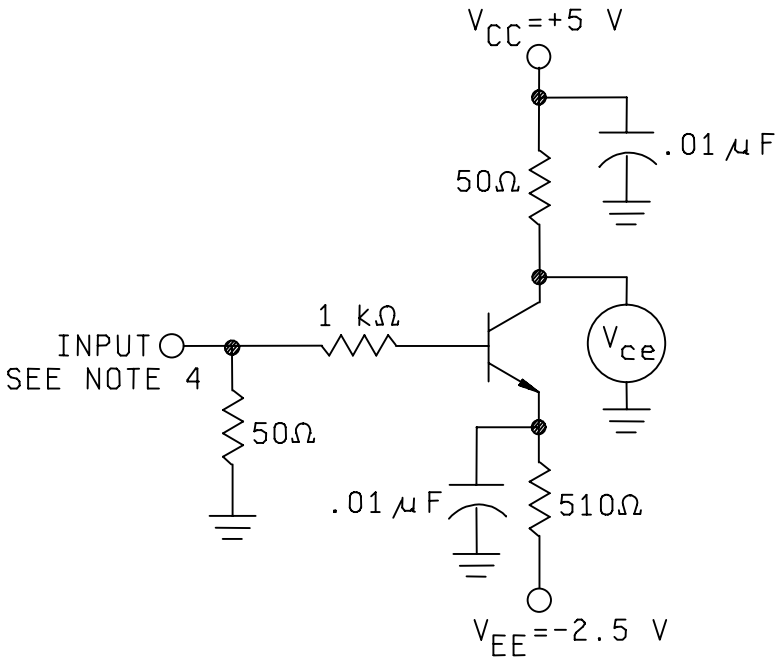
Notes:

1.

Device type	QA	QB
01	Q1	Q2
02	Q3	Q4

2. Measure V_{01}, V_{02}, (volts peak)
3. Isolation = 20 log (V_{01}/V_{02})

FIGURE 3. Channel separation test circuit.



Notes:

1. The input shall be a 100 MHz signal containing only the fundamental frequency (THD ≤ 0.5%).
2. Connect the substrate to –2.5 V.
3. With the device removed from the circuit, a shorting link is placed between the base and collector and the input signal adjusted for 1.0 mV rms on the high impedance voltmeter V_{ce}. The shorting link is then removed. The device is placed in the circuit and the reading on the voltmeter V_{ce} equal to the magnitude of h_{fe}.
4. f_t = 100 MHz x h_{fe}

FIGURE 4. Gain-bandwidth product (f_t) test circuit.

TABLE III. Group A inspection for device type 01.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		Unit
		Case M	-	3	4	5	6	7	8	-	9	10	11	12	1	2		Min	Max	
		Test no.	NC	BQ2	EQ2	CQ2	BQ1	EQ1	CQ1	NC	BQ3	SUB	CQ3	CQ4	EQ4	BQ4/ EQ3				
1	$V_{(BR)CBO}$	1		GND		10 µA	GND		10 µA			GND					CQ1	40		V
T_A =+25°C												"					CQ2	"		"
		3									GND	"	10 µA				CQ3	"		"
		4										"		10 µA			CQ4	"		"
	(BR)CEO	5			GND	1 mA		GND	1 mA			"					CQ1	15		"
	2	6										"			GND		CQ2	"		"
		7										"	1 mA			GND	CQ3	"		"
V		8										"		1 mA	GND		CQ4	"		"
	(BR)CUO	9				10 µA			10 µA			"					CQ1	60		"
		10										"					CQ2	"		"
		11										"	10 µA				CQ3	"		"
V		12										"		10 µA			CQ4	"		"
	(BR)EBO	13					GND	10 µA				"					EQ1	5.0		"
		14		GND	10 µA							"					EQ2	"		"
		15									GND	"				10 µA	EQ3	"		"
V		16										"			10 µA	GND	EQ4	"		"
	CBO	17					GND		35 V			"					CQ1		10	nA
		18		GND		35 V						"					CQ2		"	"
		19									GND	"	35 V				CQ3		"	"
		20										"		35 V		GND	CQ4		"	"
I	CEO	21										"					CQ1		"	"
		22			GND	10 V		GND	10 V			"					CQ2		"	"
		23										"	10 V			GND	CQ3		"	"
		24										"		10 V	GND		CQ4		"	"
I	CEO(D)	25											10 V	10 V	GND		CQ3, CQ4		20	"
	CUO	26							40 V			"					CQ1		10	"
		27				40 V						"					CQ2		"	"
		28										"	40 V				CQ3		"	"
I		29										"		40 V			CQ4		"	"
I	EBO	30					GND	4.0 V				"					EQ1		"	"
		31		GND	4.0 V							"					EQ2		"	"
		32									GND	"				4.0 V	EQ3		"	"
		33										"			4.0 V	GND	EQ4		"	"
I	CE(SAT)	34					1 mA	GND	10 mA			"					CQ1		0.400	V
		35		1 mA	GND	10 mA						"					CQ2		"	"
		36									1 mA	"	10 mA			GND	CQ3		"	"
V		37										"		10 mA	GND	1 mA	CQ4		"	"
	BE(SAT)	38					1 mA	GND	10 mA			"					BQ1		1.0	"
		39		1 mA	GND	10 mA						"					BQ2		"	"
		40									1 mA	"	10 mA			GND	BQ3		"	"
V		41										"		10 mA	GND	1 mA	BQ4		"	"
	BE	42					I_B	GND/ -1 mA	3 V			"					BQ1	0.600	0.800	"
												"						"	"	"
		43		I_B	GND/ -1 mA	3 V						"					BQ2	"	"	"
												"						"	"	"
V		44									I_B	"	3 V			GND/ -1 mA	BQ3	"	"	"
												"						"	"	"
		45										"		3 V	GND/ -1 mA	I_B	BQ4	"	"	"
												"						"	"	"
		46					I_B	GND/ -10 mA	3 V			"					BQ1		0.900	"
												"								"

TABLE III. Group A inspection for device type 01 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits			Note
		Case M	-	3	4	5	6	7	8	-	9	10	11	12	1	2		Min	Max	Unit	
		Test no.	NC	BQ2	EQ2	CQ2	BQ1	EQ1	CQ1	NC	BQ3	SUB	CQ3	CQ4	EQ4	BQ4/ EQ3					
1 T_A =+25°C	V_{BE}	47		B	GND/ -10 mA	3 V						GND					BQ2		0.900	V	
											I_B	"	3 V			GND/ -10 mA	BQ3		"	"	
												"		3 V	GND/ -10 mA	I_B	BQ4		"	"	
	$V_{BE(D)}$	50									I_B	"	3 V	3 V	GND/ -1 mA		BQ3	1.100	1.500	"	
	$V_{BE(D)}$	51									I_B	"	3 V	3 V	GND/ -1 mA		BQ3		1.600	"	
	$\lvert V_{BEQ1} - V_{BEQ2} \rvert$	52															-		2.0	mV	1
	h_{FE}	53					I_B	GND	3 V/ 10 µA		"						BQ1	45			2
				B	GND	3 V/ 10 µA					"						BQ2	"			2
											I_B "	"	3 V/ 10 µA			GND	BQ3	"			2
		54												3 V/ 10 µA	GND	I_B	BQ4	"			2
		55					I_B	GND	3 V/ 1 mA		"	"					BQ1	70	300		3
		56		B	GND	3 V/ 1 mA						"					BQ2	"	"		3
		57									I_B	"	3 V/ 1 mA			GND	BQ3	"	"		3
		58												3 V/ 1 mA	GND	I_B	BQ4	"	"		3
		59					I_B	GND	3 V/ 10 mA		"	"					BQ1	60			4
		60		B	GND	3 V/ 10 mA						"					BQ2	"			4
		61									I_B	"	3 V/ 10 mA			GND	BQ3	"			4
		62												3 V/ 10 mA	GND	I_B	BQ4	"			4
	h_{FEQ1}/h_{FEQ2}	63	65								"						-	0.9	1.1		5
	$h_{FE(D)}$	64	66								I_B "	"	CQ4	3 V/ 100 µA	GND		BQ3	2500			6
	$h_{FE(D)}$	67									I_B	"	CQ4	3 V/ 1 mA	GND		BQ3	4000			7

NOTES:
1. Calculate $\lvert V_{42} - V_{43} \rvert$
2. Calculate h_{FE} = 10 µA/I_B
3. Calculate h_{FE} = 1 mA/I_B
4. Calculate h_{FE} = 10 mA/I_B
5. Calculate $h_{FE}(57)/h_{FE}(58)$
6. Calculate $h_{FE(D)}$ = 100 µA/I_B
7. Calculate $h_{FE(D)}$ = 1 mA/I_B

TABLE III. Group A inspection for device type 01 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits		
		Case M	-	3	4	5	6	7	8	-	9	10	11	12	1	2		Min	Max	Unit
		Test no.	NC	BQ2	EQ2	CQ2	BQ1	EQ1	CQ1	NC	BQ3	SUB	CQ3	CQ4	EQ4	BQ4/ EQ3				
2 T_A = +125°C	I_{CBO}	68					GND		35 V			GND					CQ1		0.2	µA
						35 V						"					CQ2		"	"
			GND								GND	"	35 V				CQ3		"	"
	69											"		35 V		GND	CQ4		"	"
	I_{CEO} 70	72						GND	10 V			"					CQ1		1.0	"
	71				GND	10 V						"					CQ2		"	"
												"	10 V			GND	CQ3		"	"
	73											"		10 V	GND		CQ4		"	"
	I_{CEO} 74 (5)	76										"	10 V	10 V	GND		CQ3,CQ4		50	"
	I_{CU} 75	77							40 V			"					CQ1		200	nA
		78				40 V						"					CQ2		"	"
												"	40 V				CQ3		"	"
												"		40 V			CQ4		"	"
	79																			
	80																			

TABLE III. Group A inspection for device type 01 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits			Note
		Case M	-	3	4	5	6	7	8	-	9	10	11	12	1	2		Min	Max	Unit	
		Test no.	NC	BQ2	EQ2	CQ2	BQ1	EQ1	CQ1	NC	BQ3	SUB	CQ3	CQ4	EQ4	BQ4/ EQ3					
2 T_A = +125°C	I_{EBO}	81					GND	4.0 V									EQ1		200	nA	
		82		GND	4.0 V						GND	"					EQ2		"	"	
		83									GND	"				4.0 V	EQ3		"	"	
		84													4.0 V	GND	EQ4		"	"	
	$V_{CE(sat)}$	85					1 mA	GND	10 mA		"	"					CQ1		0.600	V	
		86		1 mA	GND	10 mA						"					CQ2		"	"	
		87									1 mA	"	10 mA			GND	CQ3		"	"	
		88												10 mA	GND	1 mA	CQ4		"	"	
	V_{BE}	89					I_B	GND/ -1 mA	3 V		"	"					BQ1	0.450	0.650	V	
		90		I_B	GND/ -1 mA	3 V						"					BQ2	"	"	"	
V		91									I_B	"	3 V			GND/ -1 mA	BQ3	"	"	"	
		92												3 V	GND/ -1 mA	I_B	BQ4	"	"	"	
		93					I_B	GND/ -10 mA	3 V		"	"					BQ1		0.750	"	
		94		I_B	GND/ -10 mA	3 V						"					BQ2		"	"	
		95									I_B	"	3 V			GND/ -10 mA	BQ3		"	"	
		96												3 V	GND/ -10 mA	I_B	BQ4		"	"	
	$V_{BE(D)}$	97									I_B "	"	3 V	3 V	GND/ -1 mA		BQ3	0.700	1.100	"	
V	$V_{BE(D)}$	98									I_B	"	3 V	3 V	GND/ -10 mA		BQ3		1.200	"	

V

TABLE III. Group A inspection for device type 01 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits			Note
		Case M	-	3	4	5	6	7	8	-	9	10	11	12	1	2		Min	Max	Unit	
		Test no.	NC	BQ2	EQ2	CQ2	BQ1	EQ1	CQ1	NC	BQ3	SUB	CQ3	CQ4	EQ4	BQ4/ EQ3					
2 T_A = +125°C	$\lvert V_{BEQ1} - V_{BEQ2} \rvert$	99										GND					-		3.0	mV	1
	$\Delta V_{BE}/\Delta T$	100										"					-	-2.2	-1.5	mV/°C	2
		101										"					-	"	"	"	3
		102										"					-	"	"	"	4
		103										"					-	"	"	"	5
"	$\Delta V_{BE(D)}/\Delta T$	104										"					-	-5.0	-3.5	"	6
"	$(\Delta \lvert V_{BEQ1} - V_{BEQ2} \rvert)/\Delta T$	105										"					-	"	15.0	µV/°C	7
"	h_{FEQ1}	106					I_B	GND	3 V/ 1 mA			"					BQ1	70	300		8
	h_{FEQ2}	107		I_B	GND	3 V/ 1 mA						"					BQ2	70	300		8
h	h_{FEQ1}/ h_{FEQ2}	108	I									"					-	0.85	1.15		9
3 T_A = -55°C	$V_{BE(sat)}$	109					1 mA	GND	10 mA			"					BQ1		1.100	V	
h	"	110		1 mA	GND	10 mA						"					BQ2			"	
	"	111									1 mA	"	10 mA			GND	BQ3			"	
	"	112										"		10 mA	GND	1 mA	BQ4			"	
	V_{BE}	113					I_B	GND/ -1 mA	3 V			"					BQ1	0.750	0.950	V	
	"	114		I_B	GND/ -1 mA	3 V						"					BQ2	0.750	0.950	"	
V																					

NOTES:
1. Calculate $(V_{89} - V_{90}) \times 10^3$
2. Calculate $(V_{89} - V_{42}) \times 10^3/100$
3. Calculate $(V_{90} - V_{43}) \times 10^3/100$
4. Calculate $(V_{91} - V_{44}) \times 10^3/100$
5. Calculate $(V_{92} - V_{45}) \times 10^3/100$
6. Calculate $(V_{97} - V_{50}) \times 10^3/100$
7. Calculate $(V_{99} - V_{52}) \times 10^3/100$
8. $h_{FE} = 1 \text{ mA}/I_B$
9. Calculate $h_{FE}(106)/h_{FE}(107)$

TABLE III. Group A inspection for device type 01 - Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits			Note
		Case M	-	3	4	5	6	7	8	-	9	10	11	12	1	2		Min	Max	Unit	
		Test no.	NC	BQ2	EQ2	CQ2	BQ1	EQ1	CQ1	NC	BQ3	SUB	CQ3	CQ4	EQ4	BQ4/ EQ3					
3 T_A = -55°C	V_{BE}	115									I_B	GND	3 V			GND/ -1 mA	BQ3	0.750	0.950	V	
"	"	116										"		3 V	GND/ -1 mA	I_B	BQ4	0.750	0.950	"	
		117					I_B	GND/ -10 mA	3 V			"					BQ1		1.000	"	
		118		B	GND/ -10 mA	3 V						"					BQ2		"	"	
		119	I								I_B	"	3 V			GND/ -10 mA	BQ3		"	"	
"		120										"		3 V	GND/ -10 mA	I_B	BQ4		"	"	
"	$\Delta V_{BE(D)}$	121									I_B	"	3 V	3 V	GND/ -1 mA		BQ3	1.500	1.900	"	
"	$\Delta V_{BE(D)}$	122									I_B	"	3 V	3 V	GND/ -10 mA		BQ3		2.000	"	
"	$\lvert V_{BEQ1} - V_{BEQ2} \rvert$	123										GND					-		3.0	mV	1
V	$\Delta V_{BE}/\Delta T$	124										"					-	-2.2	-1.5	mV/°C	2
		125										"					-	"	"	"	3
		126										"					-	"	"	"	4
		127										"					-	"	"	"	5
"	$\Delta V_{BE(D)}/\Delta T$	128										"					-	-5.0	-3.5	"	6
"	$(\Delta \lvert V_{BEQ1} - V_{BEQ2} \rvert)/\Delta T$	129										"					-	"	15.0	µV/°C	7
"	h_{FEQ1}	130					I_B	GND	3 V/ 1 mA			"					BQ1	40			8
	h_{FEQ2}	131		B	GND	3 V/ 1 mA						"					BQ2	40			8
h	h_{FEQ1}/h_{FEQ2}	132	I									"					-	0.85	1.15		9

h
h

NOTES:

1. Calculate $(V_{113} - V_{114}) \times 10^3$
2. Calculate $(V_{42} - V_{113}) \times 10^3/80$
3. Calculate $(V_{43} - V_{114}) \times 10^3/80$
4. Calculate $(V_{44} - V_{115}) \times 10^3/80$
5. Calculate $(V_{45} - V_{116}) \times 10^3/80$
6. Calculate $(V_{50} - V_{121}) \times 10^3/80$
7. Calculate $(V_{52} - V_{123}) \times 10^3/80$
8. $h_{FE} = 1\ mA/I_B$
9. $h_{FE}(130)/h_{FE}(131)$

TABLE III. Group A inspection for device type 01 - Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits			Note
		Case M	-	3	4	5	6	7	8	-	9	10	11	12	1	2		Min	Max	Unit	
		Test no.	NC	BQ2	EQ2	CQ2	BQ1	EQ1	CQ1	NC	BQ3	SUB	CQ3	CQ4	EQ4	BQ4/ EQ3					
3 T_A = -55°C	$h_{FE(D)}$	133									I_B	GND	CQ4	3 V/ 1 mA	GND		BQ3	2500			10
	FE(D)	134									I_B	"	CQ4	3 V/ 100 µA	GND		BQ3	1500			11
4 T_A = 25°C	h_{FE}	135					I_b	GND	3 V/ 1 mA			"					BQ1	60			12
h	FE	136		I_b	GND	3 V/ 1 mA						"					BQ2	60			13
	f_t	137															CQ1	300		MHz	14
h	f_t	138															CQ2	"		"	14
	f_t	139															CQ3	"		"	14
	f_t	140															CQ4	"		"	14
5 T_A = +125°C	h_{fe}	141					I_b	GND	3 V/ 1 mA			GND					BQ1	60			12
	h_{fe}	142		I_b	GND	3 V/ 1 mA						"					BQ2	60			13
6 T_A = -55°C	h_{fe}	143					I_b	GND	3 V/ 1 mA			"					BQ1	35			12
	h_{fe}	144		I_b	GND	3 V/ 1 mA						"					BQ2	35			13

NOTES:

10. $h_{FE(D)} = 1\ mA/I_{BQ3}$
11. $h_{FE(D)} = 100\ \mu A/I_{BQ3}$
12. Adjust I_b until $I_C = 1.1$ mA
13. $h_{fe} = 0.1\ mA/\Delta I_b$
14. f = 100 MHz, measure h_{fe}, $f_t = 100\ h_{fe}$ (see figure 4)

TABLE III. Group A inspection for device type 01 - Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Measured terminal	Limits			Note
		Case M	-	3	4	5	6	7	8	-	9	10	11	12	1	2		Min	Max	Unit	
		Test no.	NC	BQ2	EQ2	CQ2	BQ1	EQ1	CQ1	NC	BQ3	SUB	CQ3	CQ4	EQ4	BQ4/ EQ3					
7 T_A = +25°C	C.S.	145										GND					CQ2	80		dB	1
9 T_A = +25°C	t_d	146										"					CQ1		100	ns	2
	t_d	147										"					CQ2		100	"	"
	t_r	148										"					CQ1		50	"	"
	t_r	149										"					CQ2		50	"	"
	t_s	150										"					CQ1		200	"	"
	t_s	151										"					CQ2		200	"	"
	t_f	152										"					CQ1		80	"	"
	t_f	153										"					CQ2		80	"	"
10 T_A = +125°C	t_d	154										"					CQ1		160	"	"
	t_d	155										"					CQ2		160	"	"
	t_r	156										"					CQ1		80	"	"
	t_r	157										"					CQ2		80	"	"
	t_s	158										"					CQ1		300	"	"
	t_s	159										"					CQ2		300	"	"
	t_f	160										"					CQ1		125	"	"
	t_f	161										"					CQ2		125	"	"
11 T_A = -55°C	t_d	162										"					CQ1		160	"	"
	t_d	163										"					CQ2		160	"	"
	t_r	164										"					CQ1		80	"	"
	t_r	165										"					CQ2		80	"	"
	t_s	166										"					CQ1		300	"	"
	t_s	167										"					CQ2		300	"	"
	t_f	168										"					CQ1		125	"	"
	t_f	169										"					CQ2		125	"	"

NOTES:
1. See figure 3.
2. See figure 2.

TABLE III. Group A inspection for device type 02.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits		
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit
1 T_A = +25°C	$V_{(BR)CBO}$	1	10 µA	GND											GND		CQ1	40		V
"	"	2				GND	10 µA								"		CQ2	"		"
		3						GND		10 µA					"		CQ3	"		"
		4									GND		10 µA				CQ4	"		"
		5												GND	"	10 µA	CQ5	"		"
	$V_{(BR)CEO}$	6	1 mA		GND									"	"		CQ1	15		"
"		7			GND		1 mA								"		CQ2	"		"
"	"	8							GND	1 mA					"		CQ3	"		"
"		9										GND	1mA		"		CQ4	"		"
	"	10													"	1 mA	CQ5	"		"
"	$_{(BR)CUO}$	11	10 µA												"		CQ1	60		"
		12					10 µA								"		CQ2	"		"
"		13								10 µA					"		CQ3	"		"
V		14											10 µA				CQ4	"		"
	$V_{(BR)EBO}$	15			10 µA										"		EQ1	5.0		"
"		16			10 µA	GND								"	"		EQ2	"		"
"	"	17	GND					GND	10 µA						"		EQ3	"		"
"		18									GND	10 µA			"		EQ4	"		"
	"	19												GND	10 µA		EQ5	"		"
"	I_{CBO}	20	35 V	GND											GND		CQ1		10	nA
"	"	21				GND	35 V								"		CQ2		"	"
		22						GND		35 V					"		CQ3		"	"
		23									GND		35 V		"		CQ4		"	"
		24												GND	"	35 V	CQ5		"	"
	I_{CEO}	25	10 V		GND										"		CQ1		"	"
"		26			GND		10 V								"		CQ2		"	"
"	"	27							GND	10 V					"		CQ3		"	"
"		28										GND	10 V		"		CQ4		"	"
	"	29													"	10 V	CQ5		"	"
"																				
"																				

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits		
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit
1 T_A = +25°C	I_{CUO}	30	40 V												GND		CQ1		10	nA
	"	31					40 V								"		CQ2		"	"
		32								40 V					"		CQ3		"	"
		33											40 V		"		CQ4		"	"
	I_{EBO}	34		GND	4 V										"		EQ1		"	"
		35			4 V	GND									"		EQ2		"	"
"	"	36						GND	4 V						"		EQ3		"	"
"		37									GND	4 V			"		EQ4		"	"
	"	38												GND	4 V		EQ5		"	"
"	$_{CE(sat)}$	39	10 mA	1 mA	GND										GND		CQ1		0.400	V
	"	40			GND	1 mA	10 mA								"		CQ2		"	"
"		41						1 mA	GND	10 mA					"		CQ3		"	"
V		42									1 mA	GND	10 mA		"		CQ4		"	"
														1 mA	"	10 mA	CQ5		"	"
	$_{BE(sat)}$	44	10 mA	1 mA	GND										"		BQ1		1.000	"
"	"	45			GND	1 mA	10 mA								"		BQ2		"	"
"		46						1 mA	GND	10 mA					"		BQ3		"	"
V		47									1 mA	GND	10 mA		"		BQ4		"	"
		48												1 mA	"	10 mA	BQ5		"	"

"

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
1 T_A = +25°C	V_{BE}	49	3 V	I_B	GND/ -1 mA										GND		BQ1	0.600	0.800	V	
"	"	50			GND/ -1 mA	I_B	3 V								"		BQ2	"	"	"	
		51						I_B	GND/ -1 mA	3 V					"		BQ3	"	"	"	
		52									I_B	GND/ -1 mA	3 V		"		BQ4	"	"	"	
"		53												I_B	GND/ -1 mA	3 V	BQ5	"	"	"	
"		54	3 V	I_B	GND/ -10 mA										GND		BQ1		0.900	"	
"		55			GND/ -10 mA	I_B	3 V								"		BQ2		"	"	
"		56						I_B	GND/ -10 mA	3 V					"		BQ3		"	"	
"		57									I_B	GND/ -10 mA	3 V		"		BQ4		"	"	
"		58												I_B	GND/ -10 mA	3 V	BQ5		"	"	
"	$\|V_{BEQ1} - V_{BEQ2}\|$	59													GND		--		2.0	mV	1
"	$_{BEQ1} - V_{BEQ3}\|$	60													"		--		"	"	2
|V	$_{BEQ1} - V_{BEQ4}\|$	61													"		--		"	"	3
|V	$_{BEQ1} - V_{BEQ5}\|$	62													"		--		"	"	4
|V	$_{FE}$	63	3 V/ 10 µA	I_B	GND										"		BQ1	45			5
		64			GND	I_B	3 V/ 10 µA								"		BQ2	"			5
h		65						I_B	GND	3 V/ 10 µA					"		BQ3	"			5
"		66									I_B	GND	3 V/ 10 µA				BQ4	"			5
"		67												I_B "	"	3 V/ 10 µA	BQ5	"			5
"		68	3 V/ 1 mA	I_B	GND										"		BQ1	70			6

" NOTES:

" 1. Calculate $|V_{49} - V_{50}|$
2. Calculate $|V_{49} - V_{51}|$
3. Calculate $|V_{49} - V_{52}|$
4. Calculate $|V_{49} - V_{53}|$
5. $h_{FE} = 10\ \mu A/I_B$
6. $h_{FE} = 1\ mA/I_B$

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
1 T_A = +25°C	h_{FE}	69			GND	I_B	3 V/ 1 mA								GND		BQ2	70			1
		70						I_B	GND	3 V/ 1 mA					"		BQ3	"			1
		71									I_B	GND	3 V/ 1 mA		"		BQ4	"			1
"		72												I_B	"	3 V/ 1 mA	BQ5	"			1
"		73	3 V/ 10 mA	I_B	GND										"		BQ1	60			2
"		74			GND	I_B	3 V/ 10 mA								"		BQ2	"			2
"		75						I_B	GND	3 V/ 10 mA					"		BQ3	"			2
"	"	76									I_B	GND	3 V/ 10 mA		"		BQ4	60			2
"		77												I_B	"	3 V/ 10 mA	BQ5	60			2
	h_{FEQ1}/h_{FEQ2}	78													"		--	0.9	1.1		3
"	h_{FEQ1}/h_{FEQ3}	79													"		--	"	"		4
h	h_{FEQ1}/h_{FEQ4}	80													"		--	"	"		5
h	h_{FEQ1}/h_{FEQ5}	81													"		--	"	"		6
h																					
2 T_A = +125°C	I_{CBO}	82	35 V	GND											"		CQ1		200	nA	
"	"	83				GND	35 V								"		CQ2		"	"	
		84						GND		35 V					"		CQ3		"	"	
		85									GND		35 V		"		CQ4		"	"	
"		86												GND	"	35 V	CQ5		"	"	

" NOTES:

" 1. h_{FE} = 1 mA/I_B
2. h_{FE} = 10 mA/I_B
3. $h_{FE}(68)/h_{FE}(69)$
4. $h_{FE}(68)/h_{FE}(70)$
5. $h_{FE}(68)/h_{FE}(71)$
6. $h_{FE}(68)/h_{FE}(72)$

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
2 T_A = +125°C	I_{CEO}	87	10 V		GND										GND		CQ1		1.0	µA	
		88			GND		10 V								"		CQ2		"	"	
		89							GND	10 V					"		CQ3		"	"	
		90										GND	10 V		"		CQ4		"	"	
"		91													"	10 V	CQ5		"	"	
"	I_{CUO}	92	40 V												"		CQ1		200	"	
"		93					40 V								"		CQ2		"	"	
"		94								40 V					"		CQ3		"	"	
I		95											40 V		"		CQ4		"	"	
"	I_{EBO}	96		GND	4 V										"		EQ1		"	"	
"		97			4 V	GND									"		EQ2		"	"	
"		98						GND	4 V						"		EQ3		"	"	
I		99									GND	4 V			"		EQ4		"	"	
"	$V_{CE(sat)}$	100	10 mA	1 mA	GND										"		CQ1		0.600	V	
"	"	101			GND	1 mA	10 mA								"		CQ2		"	"	
"		102						1 mA	GND	10 mA					"		CQ3		"	"	
		103									1 mA	GND	10 mA		"		CQ4		"	"	
		104												1 mA	"	10 mA	CQ5		"	"	
"	I_{BE}	105	3 V	I_B	GND/ -1 mA										"		BQ1	0.450	0.650	"	
"		106			GND/ -1 mA	I_B	3 V								"		BQ2	"	"	"	
"		107						I_B	GND/ -1 mA	3 V					"		BQ3	"	"	"	
V		108									I_B	GND/ -1 mA	3 V		"		BQ4	"	"	"	
"		109												I_B	GND/ -1 mA	3 V	BQ5	"	"	"	
"	"	110	3 V	I_B	GND/ -10 mA										GND		BQ1		0.750	"	
"		111			GND/ -10 mA	I_B	3 V								"		BQ2		"	"	
"		112						I_B	GND/ -10 mA	3 V					"		BQ3		"	"	
		113									I_B	GND/ -10 mA	3 V		"		BQ4		"	"	
"																					
"																					
"																					

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
2 T_A = +125°C	V_{BE}	114												I_B	GND/ -10 mA	3 V	BQ5		0.750	V	
	$\lvert V_{BEQ1} - V_{BEQ2} \rvert$	115													GND		--		3.0	mV	1
	$_{BEQ1} - V_{BEQ3}\rvert$	116													"		--		"	"	2
	$_{BEQ1} - V_{BEQ4}\rvert$	117													"		--		"	"	3
|V	$_{BEQ1} - V_{BEQ5}\rvert$	118													"		--		"	"	4
|V	$\Delta V_{BE}/\Delta T$	119													"		--	-2.2	-1.3	mV/°C	5
|V		120													"		--	"	"	"	6
		121													"		--	"	"	"	7
		122													"		--	"	"	"	8
		123													"		--	"	"	"	9
"	$(\Delta\lvert V_{BEQ1} - V_{BEQ2}\rvert)/\Delta T$	124													"		--		15.0	µV/°C	10
"	$(\Delta\lvert V_{BEQ1} - V_{BEQ3}\rvert)/\Delta T$	125													"		--		"	"	11
"	$(\Delta\lvert V_{BEQ1} - V_{BEQ4}\rvert)/\Delta T$	126													"		--		"	"	12
	$(\Delta\lvert V_{BEQ1} - V_{BEQ5}\rvert)/\Delta T$	127													"		--		"	"	13
	$_{FE}$	128	3 V/ 1 mA	I_B	GND										"		BQ1	70			14
	"	129			GND	I_B	3 V/ 1 mA								"		BQ2	"			14
		130						I_B	GND	3 V/ 1 mA					"		BQ3	"			14
h		131									I_B	GND	3 V/ 1 mA		"		BQ4	"			14
		132												I_B	"	3 V/ 1 mA	BQ5	"			14
"	h_{FEQ1}/h_{FEQ2}	133													"		--	0.85	1.15		15
"	$_{FEQ1}/h_{FEQ3}$	134													"		--	"	"		16
"	$_{FEQ1}/h_{FEQ4}$	135													"		--	"	"		17
h	$_{FEQ1}/h_{FEQ5}$	136													"		--	"	"		18

h

NOTES:

h

1. Calculate $\lvert V_{105} - V_{106} \rvert$
2. Calculate $\lvert V_{105} - V_{107} \rvert$
3. Calculate $\lvert V_{105} - V_{108} \rvert$
4. Calculate $\lvert V_{105} - V_{109} \rvert$
5. Calculate $V_{105} - V_{49}/100$
6. Calculate $V_{106} - V_{50}/100$
7. Calculate $V_{107} - V_{51}/100$
8. Calculate $V_{108} - V_{52}/100$
9. Calculate $V_{109} - V_{53}/100$
10. Calculate $\lvert V_{115} - V_{59} \rvert/100$
11. Calculate $\lvert V_{116} - V_{60} \rvert/100$
12. Calculate $\lvert V_{117} - V_{61} \rvert/100$
13. Calculate $\lvert V_{118} - V_{62} \rvert/100$
14. $h_{FE} = 1$ mA/I_B
15. Calculate $h_{FE}(128)/h_{FE}(129)$
16. Calculate $h_{FE}(128)/h_{FE}(130)$
17. Calculate $h_{FE}(128)/h_{FE}(131)$
18. Calculate $h_{FE}(128)/h_{FE}(132)$

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
3 T_A = -55°C	$V_{BE(sat)}$	137	10 mA	1 mA	GND										GND		BQ1		1.100	V	
		138			GND	1 mA	10 mA								"		BQ2		"	"	
		139						1 mA	GND	10 mA					"		BQ3		"	"	
		140									1 mA	GND	10 mA		"		BQ4		"	"	
"		141												1 mA	"	10 mA	BQ5		"	"	
"	V_{BE}	142	3 V	I_B	GND/ -1 mA										"		BQ1	0.750	0.950	"	
"		143			GND/ -1 mA	I_B	3 V								"		BQ2	"	"	"	
"		144						I_B	GND/ -1 mA	3 V							BQ3	"	"	"	
	"	145									I_B	-1 mA	3 V				BQ4	"	"	"	
"	"	146									GND/			I_B "	-1 mA	3 V	BQ5	"	"	"	
"	"	147	3 V	I_B	GND/ -10 mA									GND/	GND		BQ1		1.000	"	
		148			GND/ -10 mA	I_B	3 V								"		BQ2		"	"	
		149						I_B	GND/ -10 mA	3 V							BQ3		"	"	
	"	150									I_B	-10 mA	3 V				BQ4		"	"	
"	"	151									GND/			I_B "	-10 mA	3 V	BQ5		"	"	
"	$\lvert V_{BEQ1} - V_{BEQ2} \rvert$	152												GND/	GND		--		3.0	mV	1
	$\lvert V_{BEQ1} - V_{BEQ3} \rvert$	153													"		--		"	"	2
	$\lvert V_{BEQ1} - V_{BEQ4} \rvert$	154													"		--		"	"	3
	$\lvert V_{BEQ1} - V_{BEQ5} \rvert$	155													"		--		"	"	4
	$\Delta V_{BE}/\Delta T$	156													"		--	-2.2	-1.3	mV/°C	5
		157													"		--	"	"	"	6
		158													"		--	"	"	"	7
		159													"		--	"	"	"	8
"		160													"		--	"	'		9

NOTES:
1. Calculate $\lvert V_{142} - V_{143} \rvert \times 10^3$
2. Calculate $\lvert V_{142} - V_{144} \rvert \times 10^3$
3. Calculate $\lvert V_{142} - V_{146} \rvert \times 10^3$
4. Calculate $\lvert V_{142} - V_{146} \rvert \times 10^3$
5. Calculate $(V_{49} - V_{142}) \times 10^3/80$
6. Calculate $(V_{50} - V_{143}) \times 10^3/80$
7. Calculate $(V_{51} - V_{144}) \times 10^3/80$
   Calculate $(V_{52} - V_{145}) \times 10^3/80$
8. Calculate $(V_{53} - V_{146}) \times 10^3/80$
9.

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
3 T_A = -55°C	$(\Delta\lvert V_{BEQ1} - V_{BEQ2}\rvert)/\Delta T$	161													GND		--		15.0	µV/°C	1
	$(\Delta\lvert V_{BEQ1} - V_{BEQ3}\rvert)/\Delta T$	162													"		--		"	"	2
	$(\Delta\lvert V_{BEQ1} - V_{BEQ4}\rvert)/\Delta T$	163													"		--		"	"	3
	$(\Delta\lvert V_{BEQ1} - V_{BEQ5}\rvert)/\Delta T$	164													"		--		"	"	4
	$_{FE}$	165	3 V/ 1 mA	I_B	GND										"		BQ1	40			5
	"	166			GND	I_B	3 V/ 1 mA								"		BQ2	"			5
		167						I_B	GND	3 V/ 1 mA					"		BQ3	"			5
h		168									I_B	GND	3 V/ 1 mA		"		BQ4	"			5
		169												I_B	"	3 V/ 1 mA	BQ5	"			5
"	h_{FEQ1}/h_{FEQ2}	170													"		--	0.85	1.15		6
"	$_{FEQ1}/h_{FEQ3}$	171													"		--	"	"		7
"	$_{FEQ1}/h_{FEQ4}$	172													"		--	"	"		8
h	$_{FEQ1}/h_{FEQ5}$	173													"		--	"	"		9
4 T_A = +25°C	h_{fe}	174	3 V/ 1 mA	I_B	GND										"		BQ1	60			10
h	h_{fe}	175			GND	I_B	3 V/ 1 mA								"		BQ2	60			10
	h_{fe}	176						I_B	GND	3 V/ 1 mA					"		BQ3	60			10

NOTES:

1. Calculate $|V_{59} - V_{152}| \times 10^3/80$
2. Calculate $|V_{60} - V_{153}| \times 10^3/80$
3. Calculate $|V_{61} - V_{154}| \times 10^3/80$
4. Calculate $|V_{62} - V_{155}| \times 10^3/80$
5. $h_{FE} = 1\ mA/I_B$
6. Calculate $h_{FE}(165)/h_{FE}(166)$
7. Calculate $h_{FE}(165)/h_{FE}(167)$
8. Calculate $h_{FE}(165)/h_{FE}(168)$
9. Calculate $h_{FE}(165)/h_{FE}(169)$
10. Adjust I_b until IC = 1.1 mA, $h_{FE} = 0.1\ mA/\Delta I_b$

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
4 T_A = +25°C	h_{fe}	177									I_b	GND	3 V/ 1 mA		GND		BQ4	60			1
	h_{fe}	178												I_b	GND	3 V/ 1 mA	BQ5	60			1
	f_t	179															CQ1	300		MHz	2
	"	180															CQ2	"			2
		181															CQ3	"			2
		182															CQ4	"			2
		183															CQ5	"			2
5/ T_A = +125°C	h_{fe}	184	3 V/ 1 mA	I_b	GND										GND		BQ1	60			1
"	"	185			GND	I_b	3 V/ 1 mA								"		BQ2	"			"
"		186						I_b	GND	3 V/ 1 mA					"		BQ3	"			"
	"	187									I_b	GND	3 V/ 1 mA		"		BQ4	"			"
		188												I_b	"	3 V/ 1 mA	BQ5	"			"
5/ T_A = -55°C	h_{fe}	189	3 V/ 1 mA	I_b	GND										"		BQ1	35			"
		190			GND	I_b	3 V/ 1 mA								"		BQ2	"			"
"		191						I_b	GND	3 V/ 1 mA					"		BQ3	"			"
	"	192									I_b	GND	3 V/ 1 mA		"		BQ4	"			"
"		193												I_b	"	3 V/ 1 mA	BQ5	"			"
7/ T_A = +25°C	C.S.	194													"		CQ4	80		dB	3

" NOTES:

1. Adjust I_b until I_C = 1.1 mA, h_{fe} = 0.1 mA/ΔI_b
2. f = 100 MHz, measure h_{fe}, $f_t = 100h_{fe}$ (see figure 4)
3. See figure 3.

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
9 T_A = +25°C	t_d	195													GND		CQ1		100	ns	1
		196													"		CQ2		"	"	"
		197													"		CQ3		"	"	"
	"	198													"		CQ4		"	"	"
"		199													"		CQ5		"	"	"
"	t_r	200													"		CQ1		50	"	"
		201													"		CQ2		"	"	"
"		202													"		CQ3		"	"	"
	"	203													"		CQ4		"	"	"
"		204													"		CQ5		"	"	"
"	t_s	205													"		CQ1		200	"	"
		206													"		CQ2		"	"	"
"		207													"		CQ3		"	"	"
	"	208													"		CQ4		"	"	"
"		209													"		CQ5		"	"	"
"	t_f	210													"		CQ1		80	"	"
		211													"		CQ2		"	"	"
"		212													"		CQ3		"	"	"
	"	213													"		CQ4		"	"	"
"		214													"		CQ5		"	"	"

NOTES:
1. See figure 2.

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
10 T_A = +125°C	t_d	215													GND		CQ1		160	ns	1
"	"	216													"		CQ2		"	"	"
		217													"		CQ3		"	"	"
	"	218													"		CQ4		"	"	"
		219													"		CQ5		"	"	"
"	t_r	220													"		CQ1		80	"	"
		221													"		CQ2		"	"	"
"		222													"		CQ3		"	"	"
	"	223													"		CQ4		"	"	"
"		224													"		CQ5		"	"	"
"	t_s	225													"		CQ1		300	"	"
		226													"		CQ2		"	"	"
"		227													"		CQ3		"	"	"
	"	228													"		CQ4		"	"	"
"		229													"		CQ5		"	"	"
"	t_f	230													"		CQ1		125	"	"
		231													"		CQ2		"	"	"
"		232													"		CQ3		"	"	"
	"	233													"		CQ4		"	"	"
"		234													"		CQ5		"	"	"

NOTES:
" 1. See figure 2.

TABLE III. Group A inspection for device type 02 – Continued.
Terminal conditions (pins not designated may be H ≥ 2.0 V, or L ≤ 0.8 V, or open)

Subgroup	Symbol	Cases A,C,D	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Limits			Note
		Test no.	CQ1	BQ1	EQ1, 2	BQ2	CQ2	BQ3	EQ3	CQ3	BQ4	EQ4	CQ4	BQ5	EQ5/ SUB	CQ5	Measured terminal	Min	Max	Unit	
11 T_A = -55°C	t_d	235													GND		CQ1		160	ns	1
		236													"		CQ2		"	"	"
		237													"		CQ3		"	"	"
"	"	238													"		CQ4		"	"	"
"		239													"		CQ5		"	"	"
	t_r	240													"		CQ1		80	"	"
"		241													"		CQ2		"	"	"
		242													"		CQ3		"	"	"
"	"	243													"		CQ4		"	"	"
"		244													"		CQ5		"	"	"
	t_s	245													"		CQ1		300	"	"
"		246													"		CQ2		"	"	"
		247													"		CQ3		"	"	"
"	"	248													"		CQ4		"	"	"
"		249													"		CQ5		"	"	"
	t_f	250													"		CQ1		125	"	"
"		251													"		CQ2		"	"	"
		252													"		CQ3		"	"	"
"	"	253													"		CQ4		"	"	"
"		254													"		CQ5		"	"	"

NOTES:
" 1. See figure 2

4.5.2 Life test cooldown procedure. When devices are measured at 25°C following application of the operating life or burn-in test condition, they shall be cooled to within 10°C of their power stable condition room temperature prior to removal of the bias.

Table IV. Groups B and C end point electrical parameters (T_A = 25°C).

Test	Device types 01 and 02	
	Limit	Delta
V_{BE}	0.600 V min 0.800 V max	±0.010 V
$\|V_{BEQA} - V_{BEQB}\|$	2.0 mV	
h_{FE}	70 min 300 max 1/	±10%

1/ The 300 max limit applies to device type 01 only.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of the specification.

b. Complete part number (see 1.2).

c. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

d. Requirements for certificate of compliance, if applicable.

e. Requirements for notification of change of product or process to acquiring activity in addition to notification of the qualifying activity, if applicable.

f. Requirements for failure analysis (including required test condition of MIL-STD-883, method 5003), corrective action and reporting of results, if applicable.

g. Requirements for product assurance options.

h. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements should not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.

i. Requirements for "JAN" marking.

j. Packaging requirements (see 5.1).

6.3 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractor's parts lists.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43123-1199.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535, MIL-HDBK-1331, and as follows:.

$V_{(BR)CUO}$ ---------- Breakdown voltage, collector to substrate
I_{CUO} ---------- Collector to substrate cutoff current
V_{CU} ---------- Collector to substrate voltage (dc)

6.6 Logistic support. Lead materials and finishes (see 3.3) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information should not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-PRF-38535.

Military device type	Generic-industry type
01	3018A
02	3045

6.8 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Army – CR
Navy - EC
Air Force - 11
DLA – CC

Preparing activity:
DLA - CC

Project 5962-1990

Review activities:
Air Force - 19