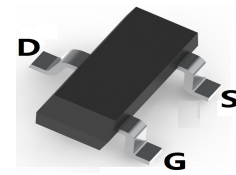
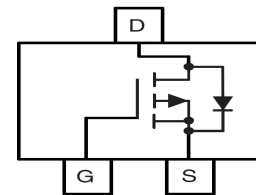


**P-Channel Power MOSFET**
**FEATURES**

- Generation V Technology
- Ultra Low On-Resistance
- Low Profile (<1.1mm)
- Fast Switching


**SOT-23**

**MECHANICAL DATA**

- Case: SOT-23
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.008 grams (approximate)

**MARKING:1C7A**
**Absolute Maximum Ratings( $T_A = 25^\circ\text{C}$  unless otherwise noted)**

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -4.5\text{V}$	-0.78	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -4.5\text{V}$	-0.62	
$I_{DM}$	Pulsed Drain Current ①	-4.9	
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation	540	mW
	Linear Derating Factor	4.3	mW/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 12$	V
dv/dt	Peak Diode Recovery dv/dt ②	-5.0	V/ns
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to +150	°C
$R_{\theta JA}$	Maximum Junction-to-Ambient ④	230	°C/W

**Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-20	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-4.9	—	mV/°C	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	—	—	0.60	$\Omega$	$V_{GS} = -4.5\text{V}, I_D = -0.61\text{A}$ ③
		—	—	0.90		$V_{GS} = -2.7\text{V}, I_D = -0.31\text{A}$ ③
$V_{GS(th)}$	Gate Threshold Voltage	-0.70	—	-1.5	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
$g_{fs}$	Forward Transconductance	0.56	—	—	S	$V_{DS} = -10\text{V}, I_D = -0.31\text{A}$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-1.0	$\mu\text{A}$	$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}$
		—	—	-25		$V_{DS} = -16\text{V}, V_{GS} = 0\text{V}, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -12\text{V}$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 12\text{V}$
$Q_g$	Total Gate Charge	—	2.4	3.6	nC	$I_D = -0.61\text{A}$
$Q_{gs}$	Gate-to-Source Charge	—	0.56	0.84		$V_{DS} = -16\text{V}$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	1.0	1.5		$V_{GS} = -4.5\text{V}$ , See Fig. 6 and 9 ③
$t_{d(on)}$	Turn-On Delay Time	—	13	—	ns	$V_{DD} = -10\text{V}$
$t_r$	Rise Time	—	18	—		$I_D = -0.61\text{A}$
$t_{d(off)}$	Turn-Off Delay Time	—	22	—		$R_G = 6.2\Omega$
$t_f$	Fall Time	—	22	—		$R_D = 16\Omega$ , See Fig. 10 ③
$C_{iss}$	Input Capacitance	—	97	—	pF	$V_{GS} = 0\text{V}$
$C_{oss}$	Output Capacitance	—	53	—		$V_{DS} = -15\text{V}$
$C_{rss}$	Reverse Transfer Capacitance	—	28	—		$f = 1.0\text{MHz}$ , See Fig. 5

**Source-Drain Ratings and Characteristics**

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-0.54	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	-4.9		
$V_{SD}$	Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}, I_S = -0.61\text{A}, V_{GS} = 0\text{V}$ ③
$t_{rr}$	Reverse Recovery Time	—	35	53	ns	$T_J = 25^\circ\text{C}, I_F = -0.61\text{A}$
$Q_{rr}$	Reverse Recovery Charge	—	26	39	nC	di/dt = $100\text{A}/\mu\text{s}$ ④

**Notes:** ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )

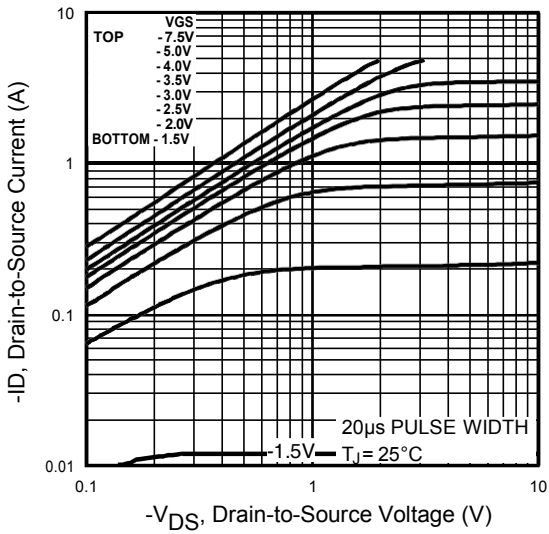
②  $I_{SD} \leq -0.61\text{A}, di/dt \leq 76\text{A}/\mu\text{s}, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$

③ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

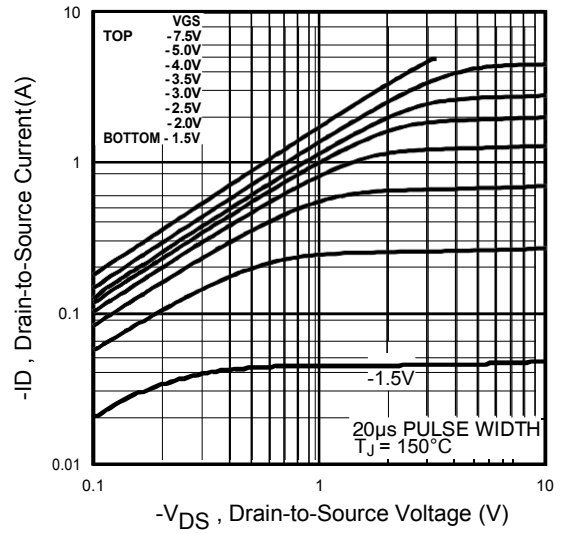
④ Surface mounted on FR-4 board,  $t \leq 5\text{sec}$ .

P-Channel Power MOSFET

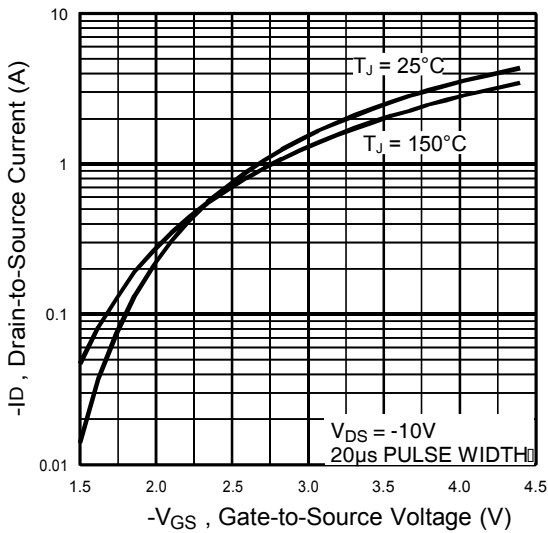
**Typical Characteristics**



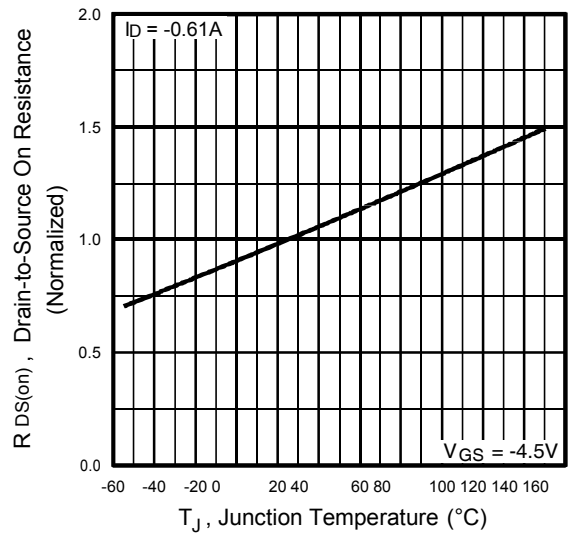
**Fig 1.** Typical Output Characteristics



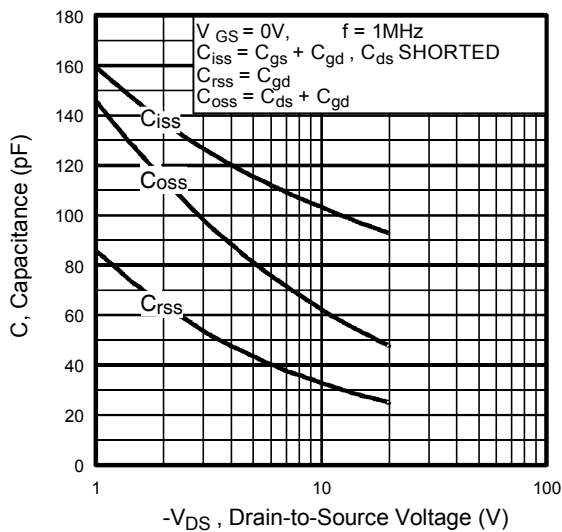
**Fig 2.** Typical Output Characteristics



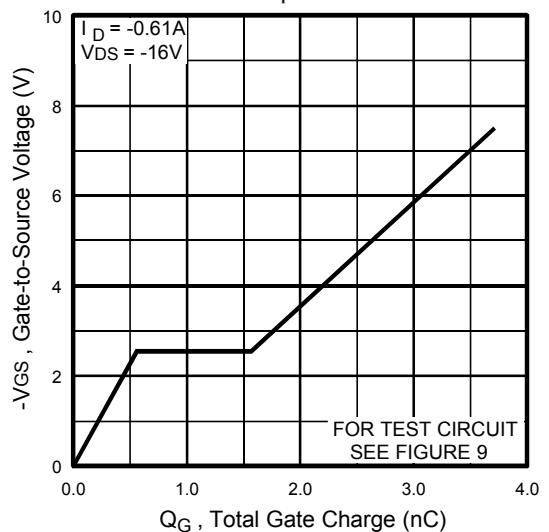
**Fig 3.** Typical Transfer Characteristics



**Fig 4.** Normalized On-Resistance Vs. Temperature

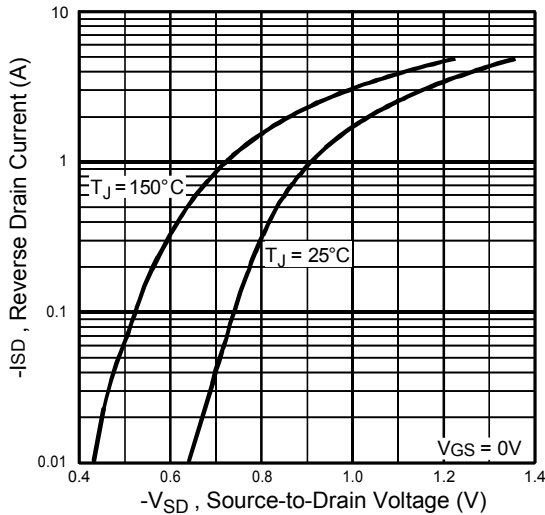


**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

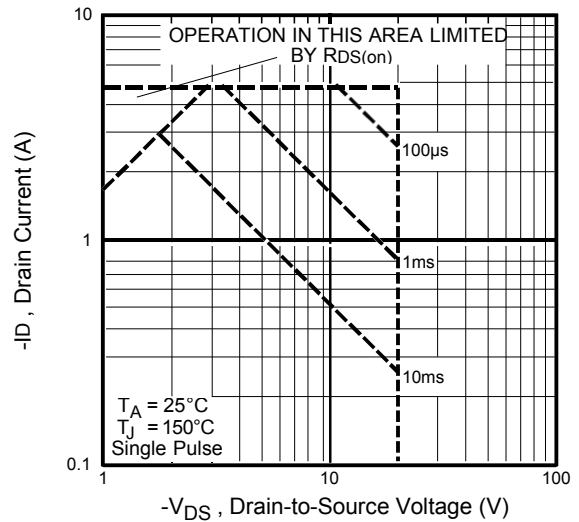


**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

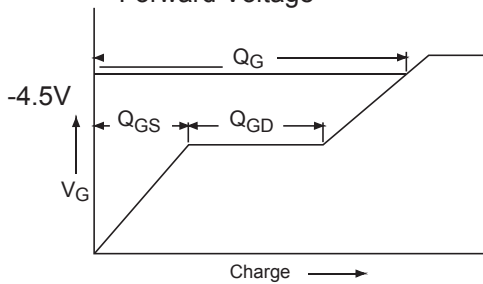
P-Channel Power MOSFET



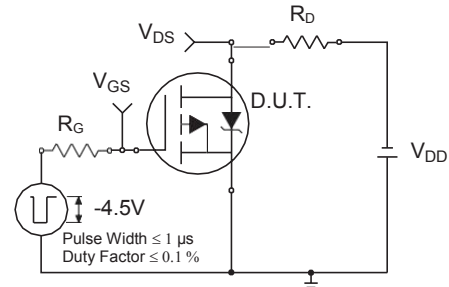
**Fig 7. Typical Source-Drain Diode Forward Voltage**



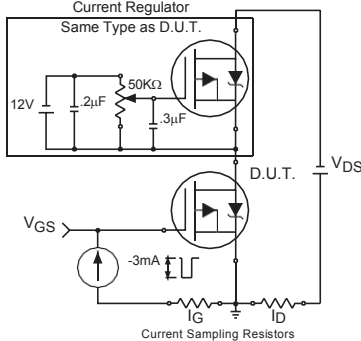
**Fig 8. Maximum Safe Operating Area**



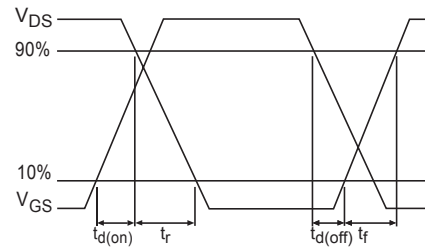
**Fig 9a. Basic Gate Charge Waveform**



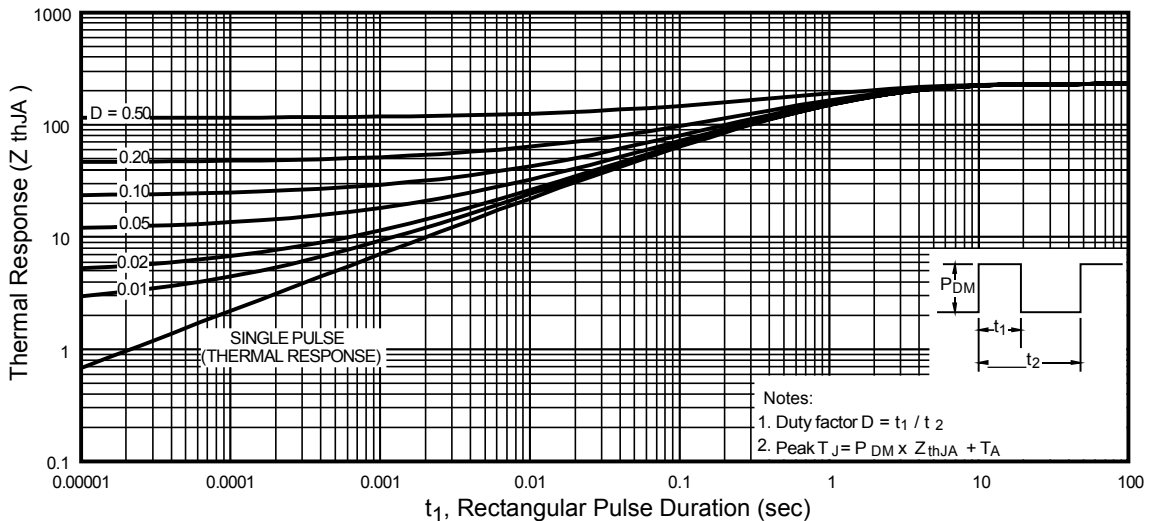
**Fig 10a. Switching Time Test Circuit**



**Fig 9b. Gate Charge Test Circuit**



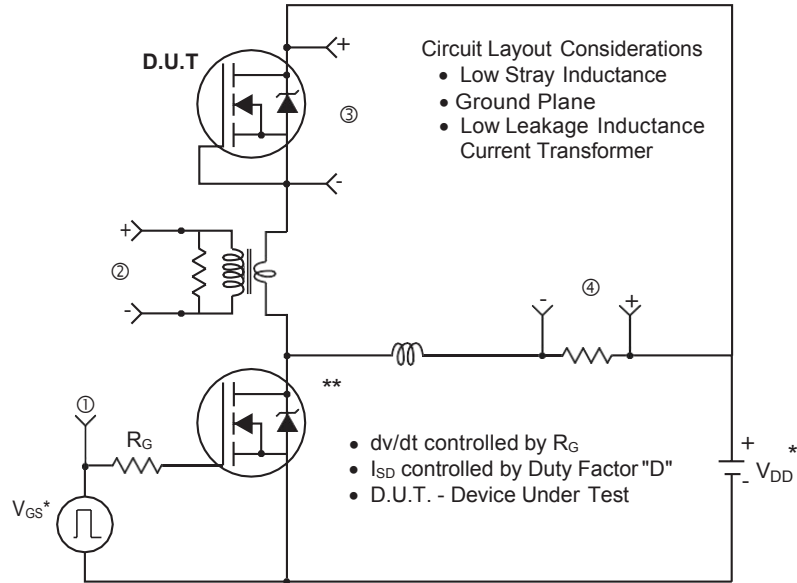
**Fig 10b. Switching Time Waveforms**



**Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient**

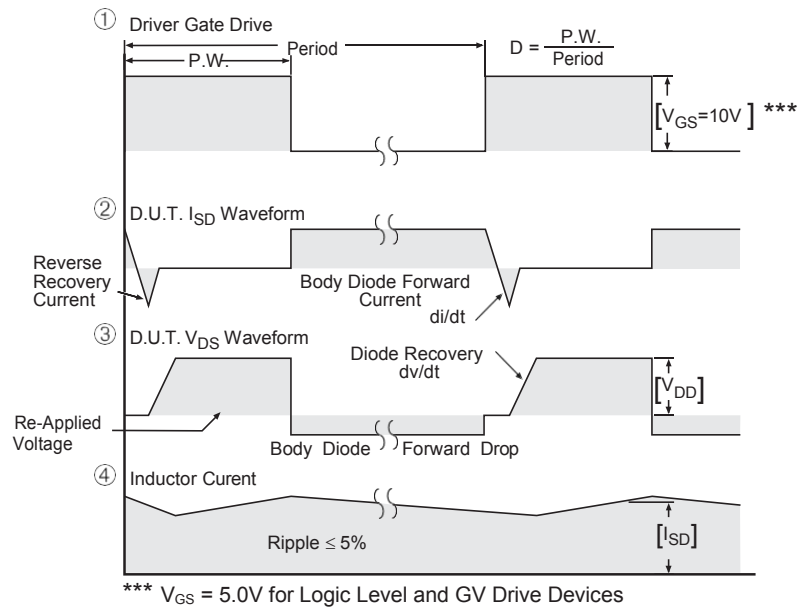
P-Channel Power MOSFET

**Peak Diode Recovery dv/dt Test Circuit**



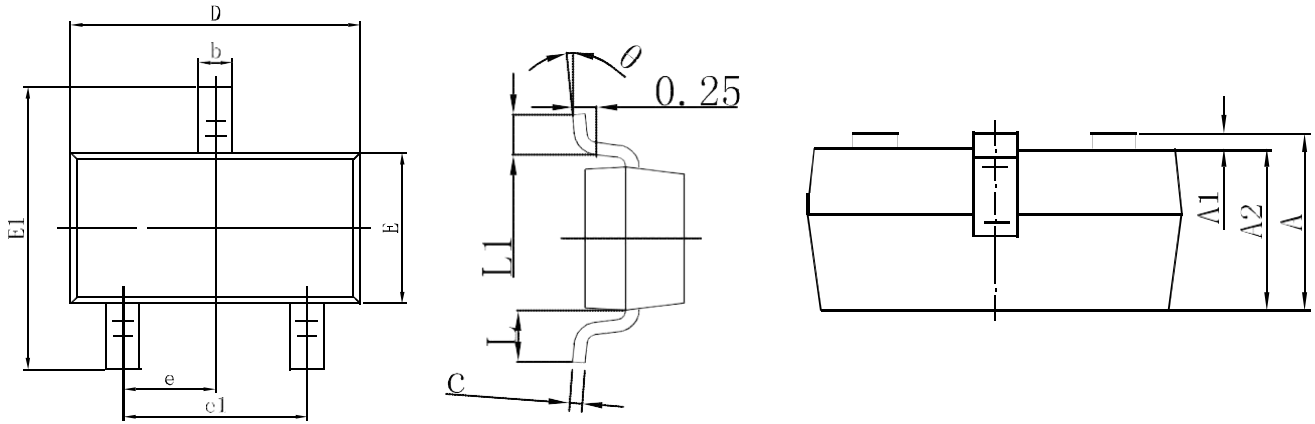
\* Reverse Polarity for P-Channel

\*\* Use P-Channel Driver for P-Channel Measurements



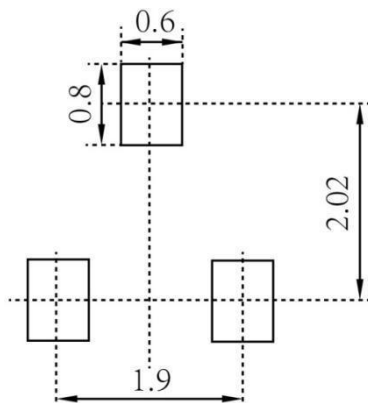
**Fig 13. For P-Channel HEXFETS**

**SOT-23 Package Outline Dimensions**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

**SOT-23 Suggested Pad Layout**

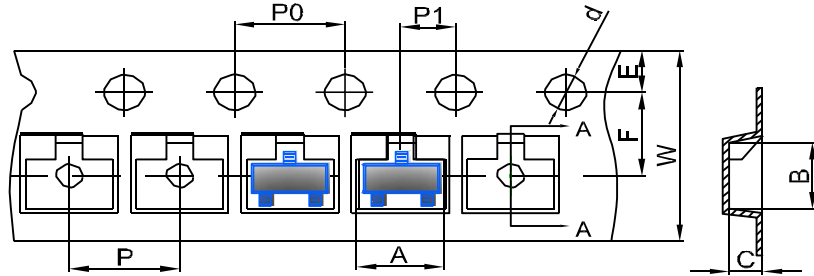


**Note:**

1. Controlling dimension: in millimeters
2. General tolerance: ±0.05mm
3. The pad layout is for reference purposes only

## SOT-23 Tape and Reel

### SOT-23 Embossed Carrier Tape

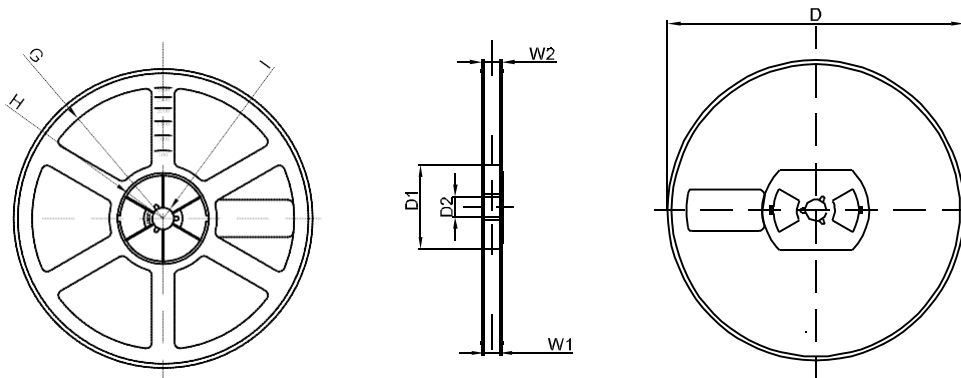


DIMENSIONS ARE IN MILLIMETER										
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

### SOT-23 Tape Leader and Trailer



### SOT-23 Reel



DIMENSIONS ARE IN MILLIMETER								
REEL OPTION	D	D1	D2	G	H	I	W1	W2
7" DIA	Ø178	54.40	13.00	R78	R25.60	R6.50	9.50	12.30
TOLERANCE	±2	±1	±1	±1	±1	±1	±1	±1