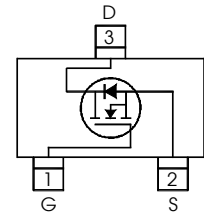
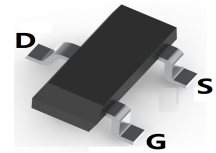


**N-CHANNEL POWER MOSFET**
**FEATURES**

- Ultra low on-resistance:  $V_{DS}=20V, R_{DS(ON)}=0.25\Omega @ V_{GS}=4.5V, I_D=1.2A$
- Surface Mount device


**MECHANICAL DATA**

- Case: SOT-23
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Weight: 0.008 grams (approximate)

**Absolute Maximum Ratings**

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 4.5V$	1.2	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 4.5V$	0.95	
$I_{DM}$	Pulsed Drain Current ①	7.4	
$P_D @ T_A = 25^\circ C$	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

**Thermal Resistance**

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ④	—	230	°C/W

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.024	—	V/°C	Reference to $25^\circ C, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.25 0.35	$\Omega$	$V_{GS} = 4.5V, I_D = 0.93A$ ③ $V_{GS} = 2.7V, I_D = 0.47A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	0.70	—	—	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$g_{fs}$	Forward Transconductance	1.3	—	—	S	$V_{DS} = 10V, I_D = 0.47A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0 25	$\mu A$	$V_{DS} = 16V, V_{GS} = 0V$ $V_{DS} = 16V, V_{GS} = 0V, T_J = 125^\circ C$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -12V$
	Gate-to-Source Reverse Leakage	—	—	100	nA	$V_{GS} = 12V$
$Q_g$	Total Gate Charge	—	2.6	3.9	nC	$I_D = 0.93A$
$Q_{gs}$	Gate-to-Source Charge	—	0.41	0.62	nC	$V_{DS} = 16V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	1.1	1.7	nC	$V_{GS} = 4.5V$ , See Fig. 6 and 9 ③
$t_{d(on)}$	Turn-On Delay Time	—	2.5	—	ns	$V_{DD} = 10V$
$t_r$	Rise Time	—	9.5	—		$I_D = 0.93A$
$t_{d(off)}$	Turn-Off Delay Time	—	9.7	—		$R_G = 6.2\Omega$
$t_f$	Fall Time	—	4.8	—		$R_D = 11\Omega$ , See Fig. 10 ③
$C_{iss}$	Input Capacitance	—	110	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	51	—		$V_{DS} = 15V$
$C_{rss}$	Reverse Transfer Capacitance	—	25	—		$f = 1.0MHz$ , 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	—	—	7.4		
$V_{SD}$	Diode Forward Voltage	—	—	1.2	V	$T_J = 25^\circ C, I_S = 0.93A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	25	38	ns	$T_J = 25^\circ C, I_F = 0.93A$
$Q_{rr}$	Reverse Recovery Charge	—	16	24	nC	$di/dt = 100A/\mu s$ ③

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

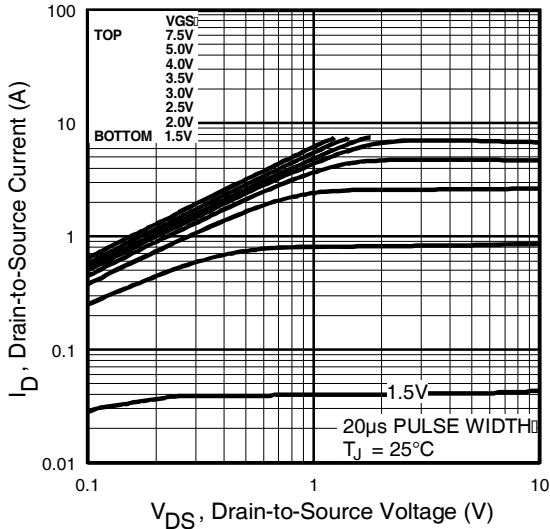
②  $I_{SD} \leq 0.93A, di/dt \leq 90A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ C$

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

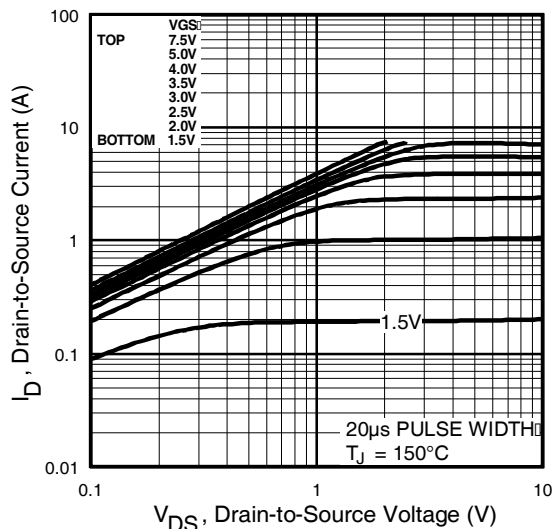
④ Surface mounted on FR-4 board,  $t \leq 5sec$ .

**N-CHANNEL POWER MOSFET**

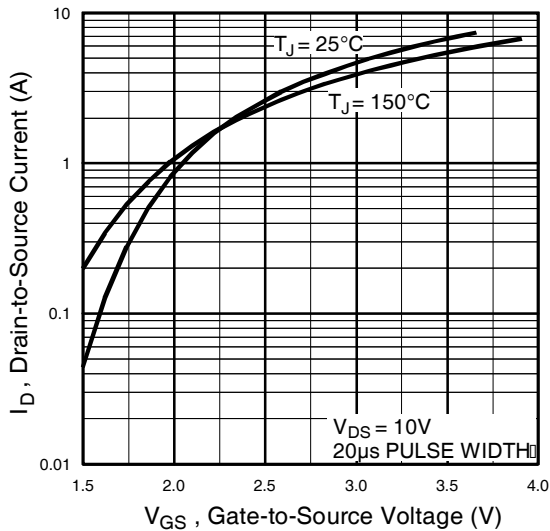
**Typical Characteristics**



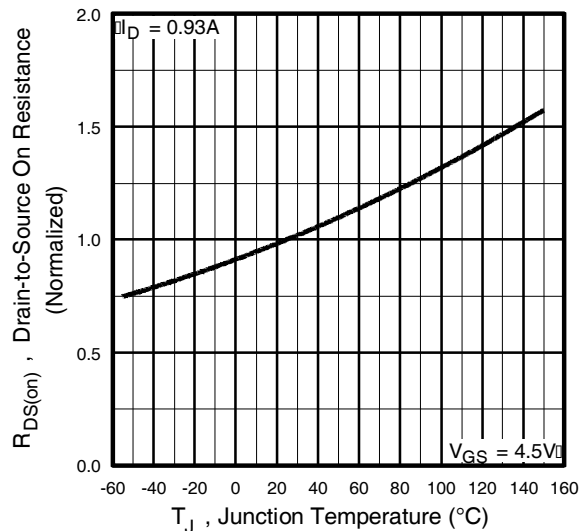
**Fig 1. Typical Output Characteristics**



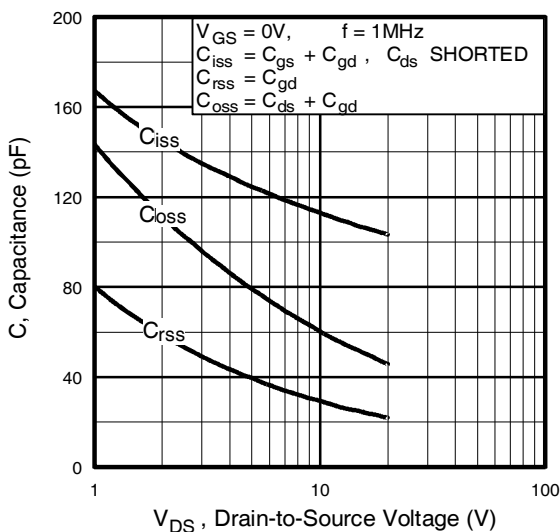
**Fig 2. Typical Output Characteristics**



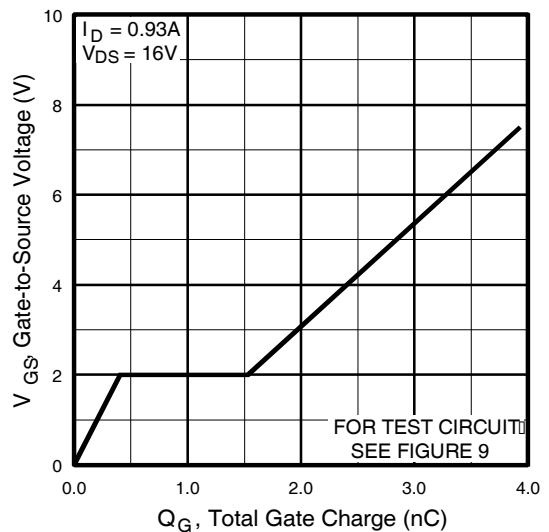
**Fig 3. Typical Transfer Characteristics**



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

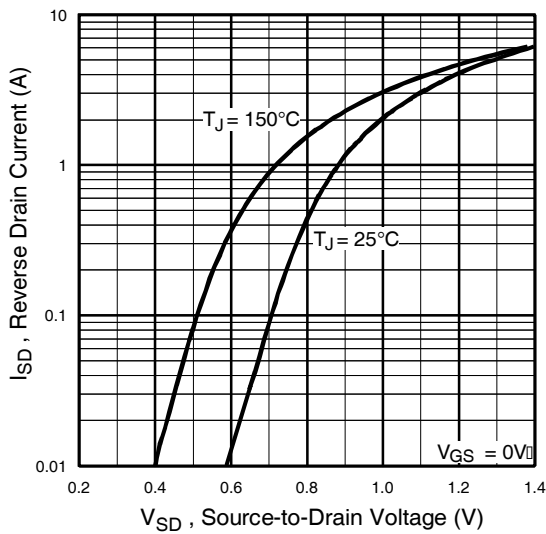


**Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage**

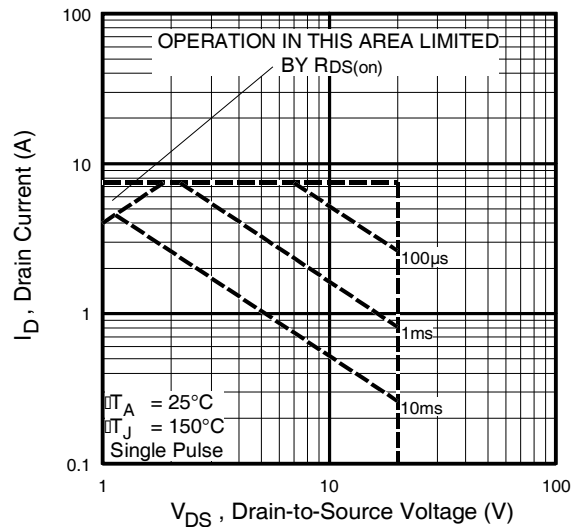


**Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage**

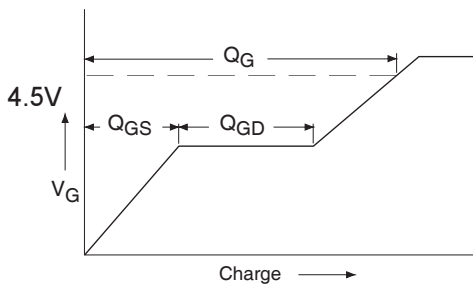
**N-CHANNEL POWER MOSFET**



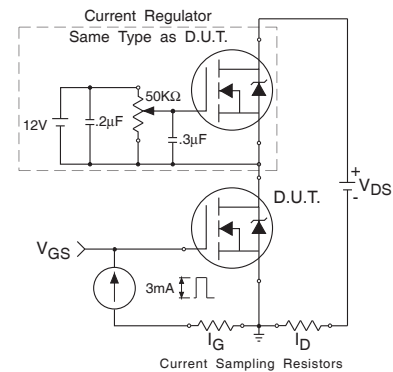
**Fig 7. Typical Source-Drain Diode Forward Voltage**



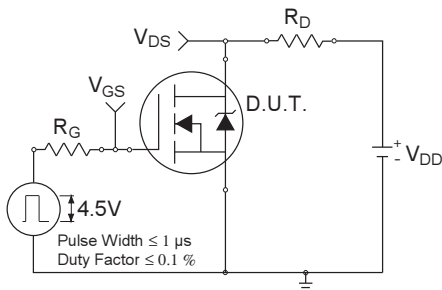
**Fig 8. Maximum Safe Operating Area**



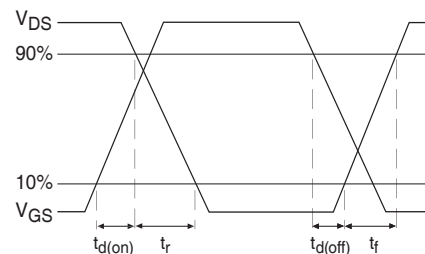
**Fig 9a. Basic Gate Charge Waveform**



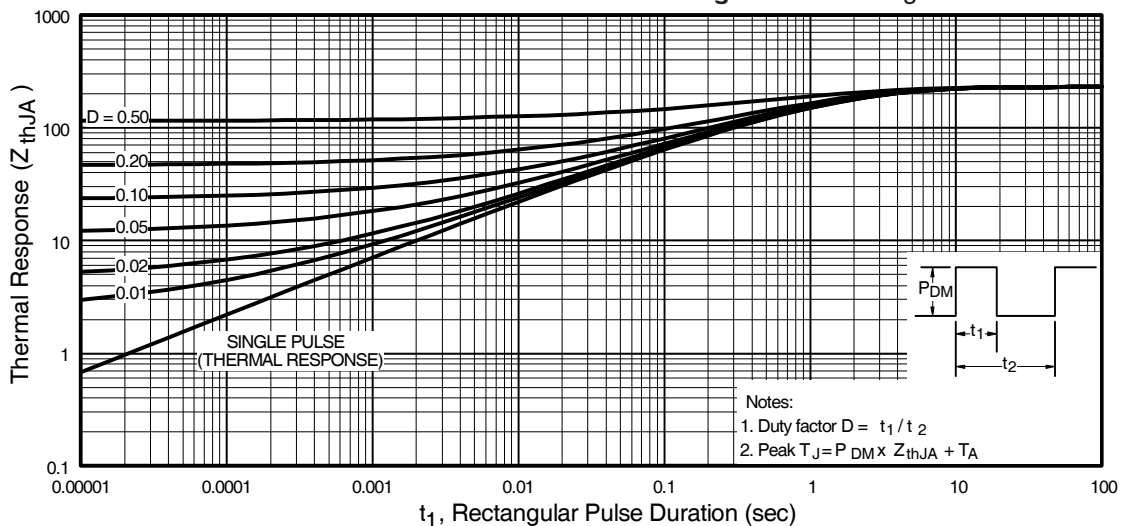
**Fig 9b. Gate Charge Test Circuit**



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



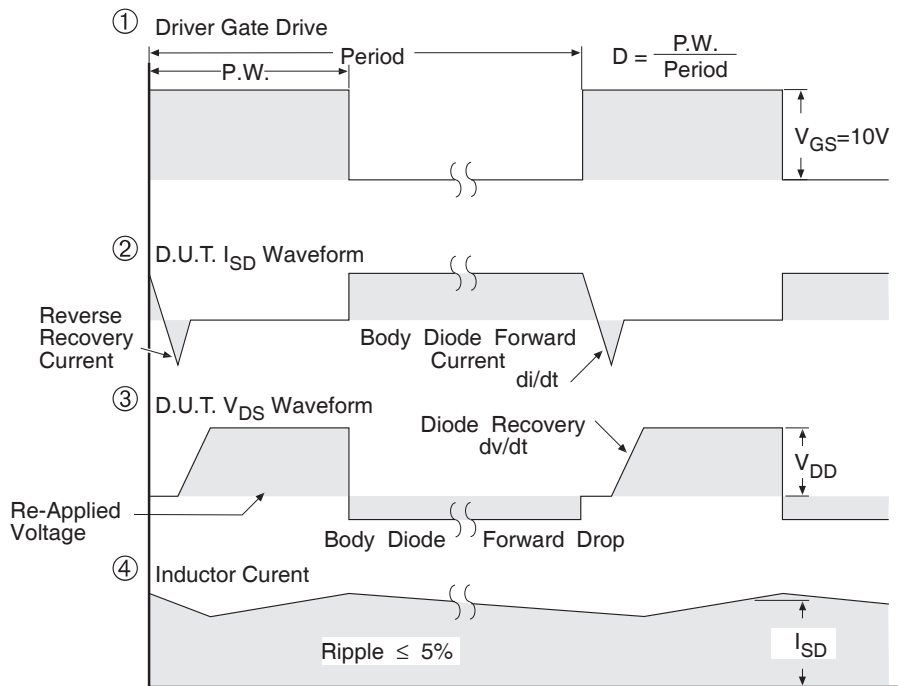
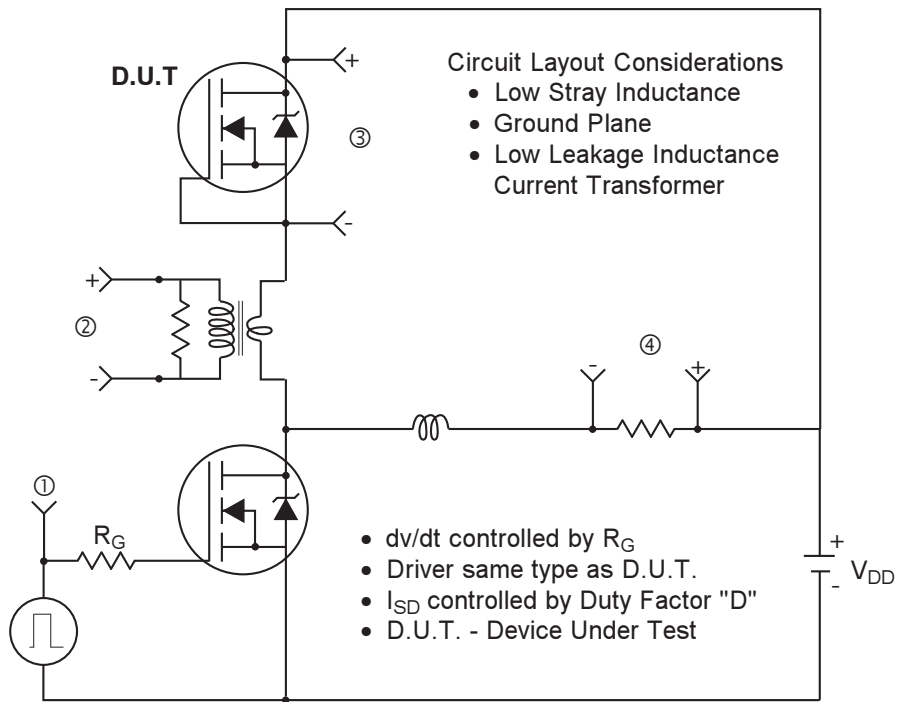
**Fig 10b. Switching Time Waveforms**



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

**N-CHANNEL POWER MOSFET**

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

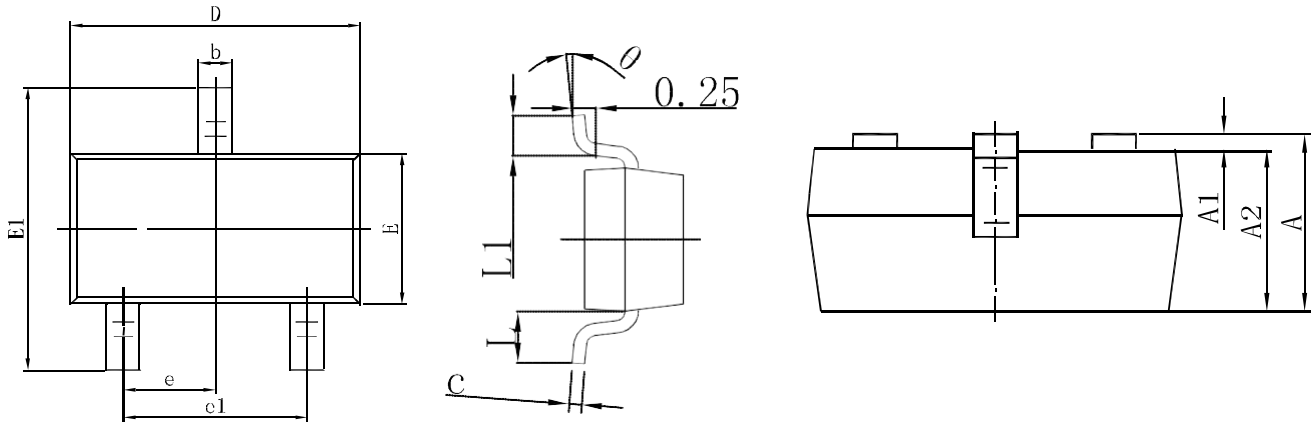


\*  $V_{GS} = 5V$  for Logic Level Devices

**Fig 12. For N-Channel HEXFETS**

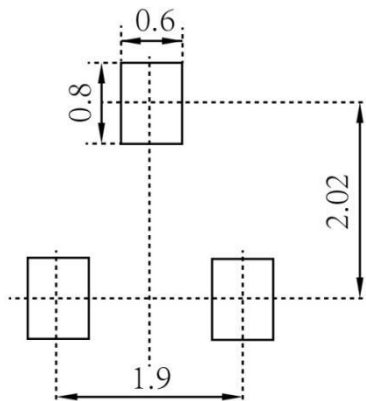
**N-CHANNEL POWER MOSFET**

**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**



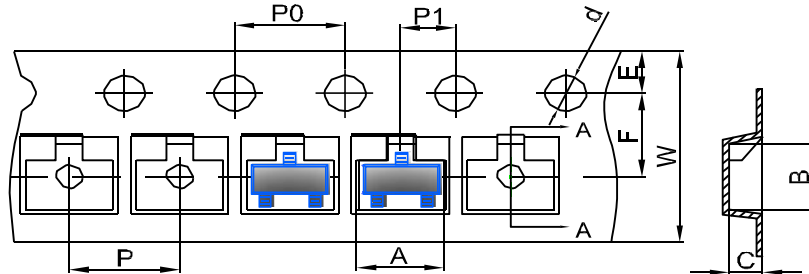
**Note:**

1. Controlling dimension: in millimeters
2. General tolerance:  $\pm 0.05\text{mm}$
3. The pad layout is for reference purposes only

**N-CHANNEL POWER MOSFET**

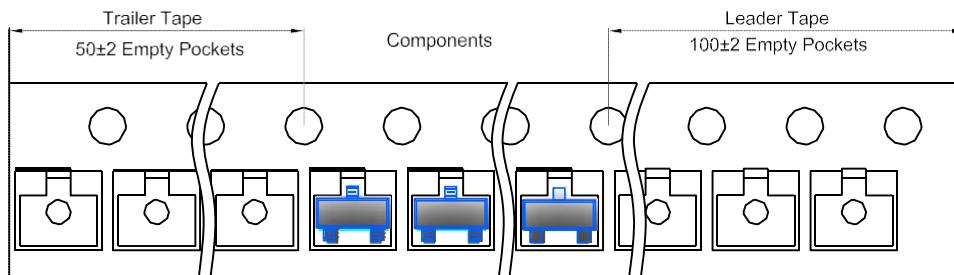
**SOT-23 Tape and Reel**

**SOT-23 Embossed Carrier Tape**

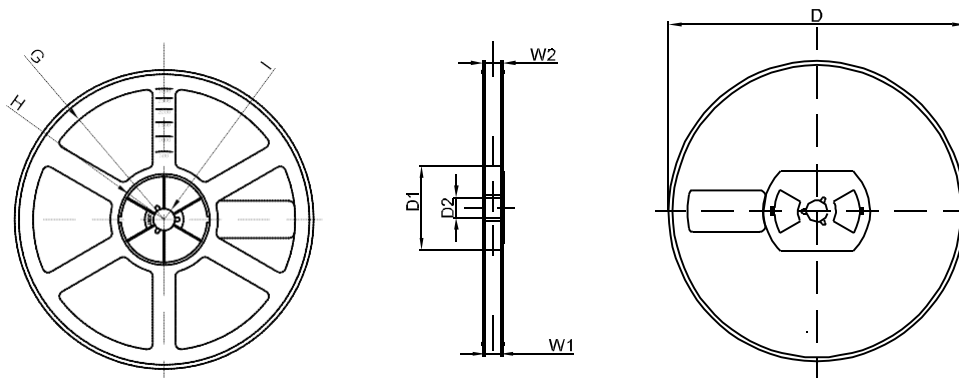


DIMENSIONS ARE IN MILLIMETER										
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

**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