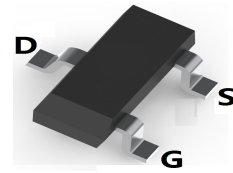
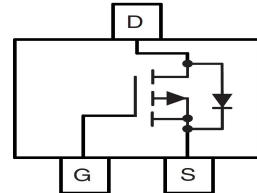


**P-Channel Power MOSFET**
**FEATURES**

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

**MECHANICAL DATA**

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

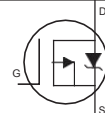

**SOT-23**

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

	Parameter	Max.	Units
$V_{DS}$	Drain- Source Voltage	-30	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -10\text{V}$	-3.0	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ -10\text{V}$	-2.4	
$I_{DM}$	Pulsed Drain Current ①	-24	
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation	1.25	W
$P_D @ T_A = 70^\circ\text{C}$	Power Dissipation	0.80	
	Linear Derating Factor	10	mW/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to + 150	°C
$R_{\theta JA}$	Maximum Junction-to-Ambient ③	100	°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	-30	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.019	—	V/°C	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	98	m $\Omega$	$V_{GS} = -10\text{V}, I_D = -3.0\text{A}$ ②
		—	—	165		$V_{GS} = -4.5\text{V}, I_D = -2.6\text{A}$ ②
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	—	-2.5	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
$g_{fs}$	Forward Transconductance	3.1	—	—	S	$V_{DS} = -10\text{V}, I_D = -3.0\text{A}$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-1.0	$\mu\text{A}$	$V_{DS} = -24\text{V}, V_{GS} = 0\text{V}$
		—	—	-5.0		$V_{DS} = -24\text{V}, V_{GS} = 0\text{V}, T_J = 70^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 20\text{V}$
$Q_g$	Total Gate Charge	—	9.5	14	nC	$I_D = -3.0\text{A}$
$Q_{gs}$	Gate-to-Source Charge	—	2.3	3.5		$V_{DS} = -24\text{V}$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	1.6	2.4		$V_{GS} = -10\text{V}$ ②
$t_{d(on)}$	Turn-On Delay Time	—	12	—	ns	$V_{DD} = -15\text{V}$ ②
$t_r$	Rise Time	—	18	—		$I_D = -1.0\text{A}$
$t_{d(off)}$	Turn-Off Delay Time	—	88	—		$R_G = 6.0\Omega$
$t_f$	Fall Time	—	52	—		$V_{GS} = -10\text{V}$
$C_{iss}$	Input Capacitance	—	510	—	pF	$V_{GS} = 0\text{V}$
$C_{oss}$	Output Capacitance	—	71	—		$V_{DS} = -25\text{V}$
$C_{rss}$	Reverse Transfer Capacitance	—	43	—		$f = 1.0\text{MHz}$

**Source-Drain Ratings and Characteristics**

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-1.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	-24		
$V_{SD}$	Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}, I_S = -1.3\text{A}, V_{GS} = 0\text{V}$ ②
$t_{rr}$	Reverse Recovery Time	—	17	26	ns	$T_J = 25^\circ\text{C}, I_F = -1.3\text{A}$
$Q_{rr}$	Reverse Recovery Charge	—	12	18	nC	$di/dt = -100\text{A}/\mu\text{s}$ ②

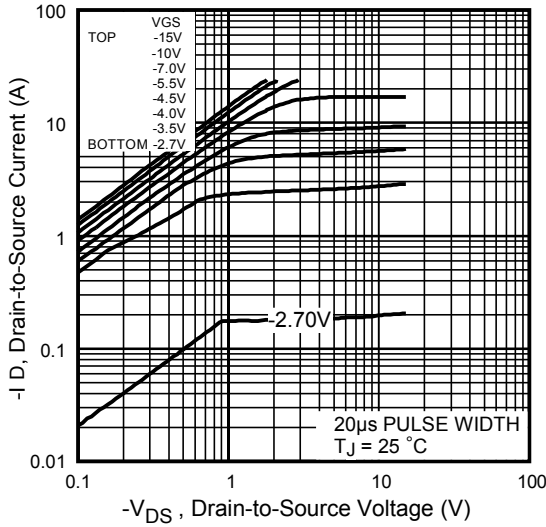
**Notes:** ① Repetitive rating; pulse width limited by max. junction temperature.

② Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

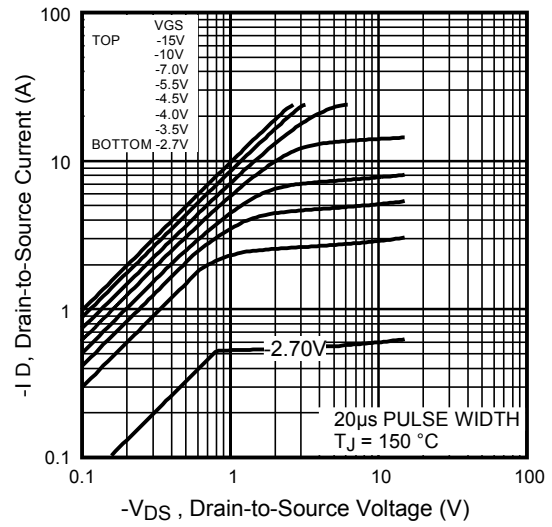
③ Surface mounted on FR-4 board,  $t \leq 5\text{sec}$ .

P-Channel Power MOSFET

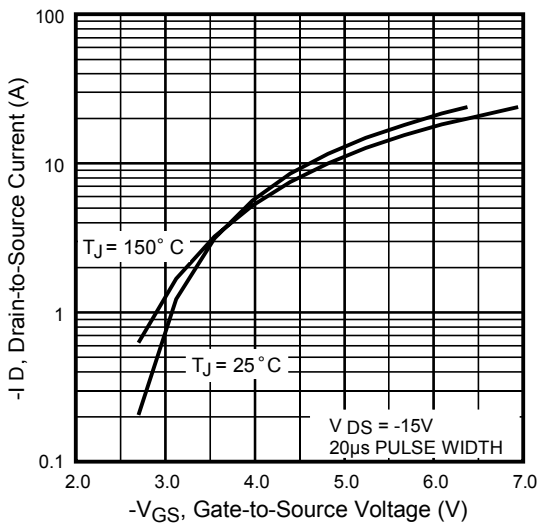
Typical Characteristics



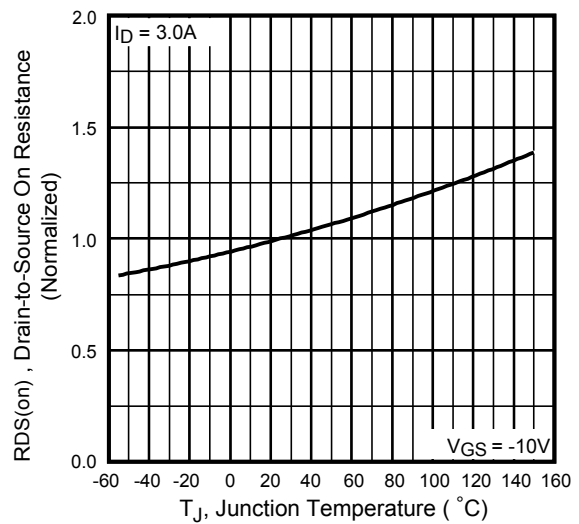
**Fig 1.** Typical Output Characteristics



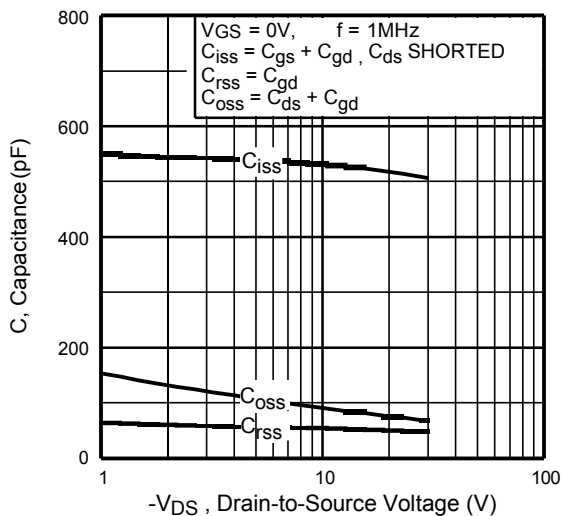
**Fig 2.** Typical Output Characteristics



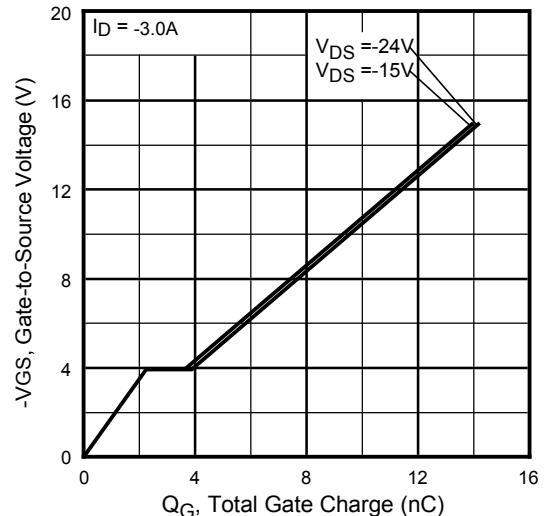
**Fig 3.** Typical Transfer Characteristics



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

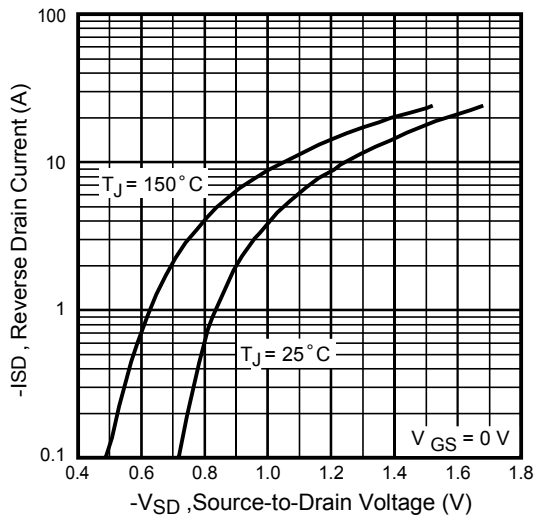


**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

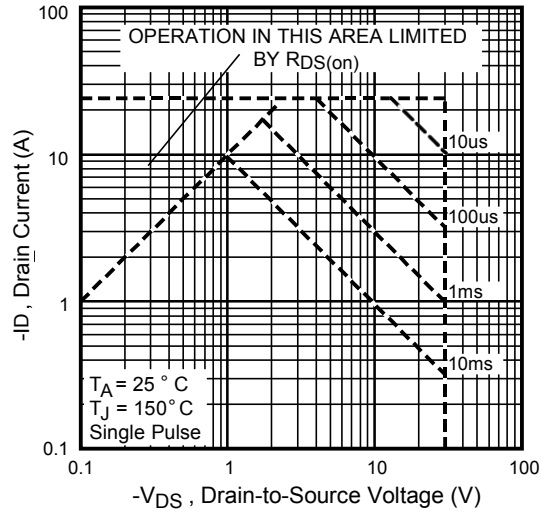


**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

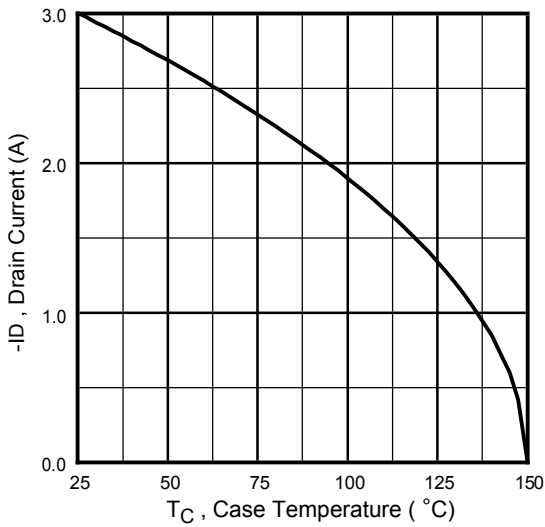
P-Channel Power MOSFET



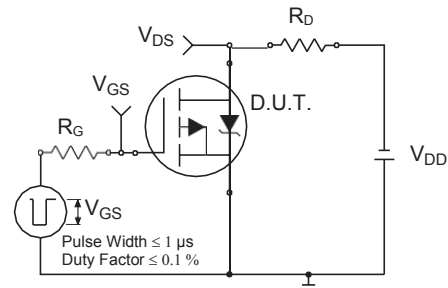
**Fig 7.** Typical Source-Drain Diode Forward Voltage



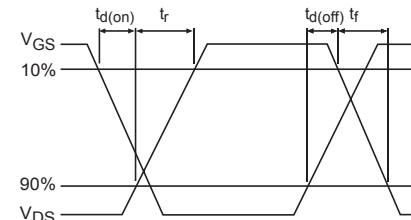
**Fig 8.** Maximum Safe Operating Area



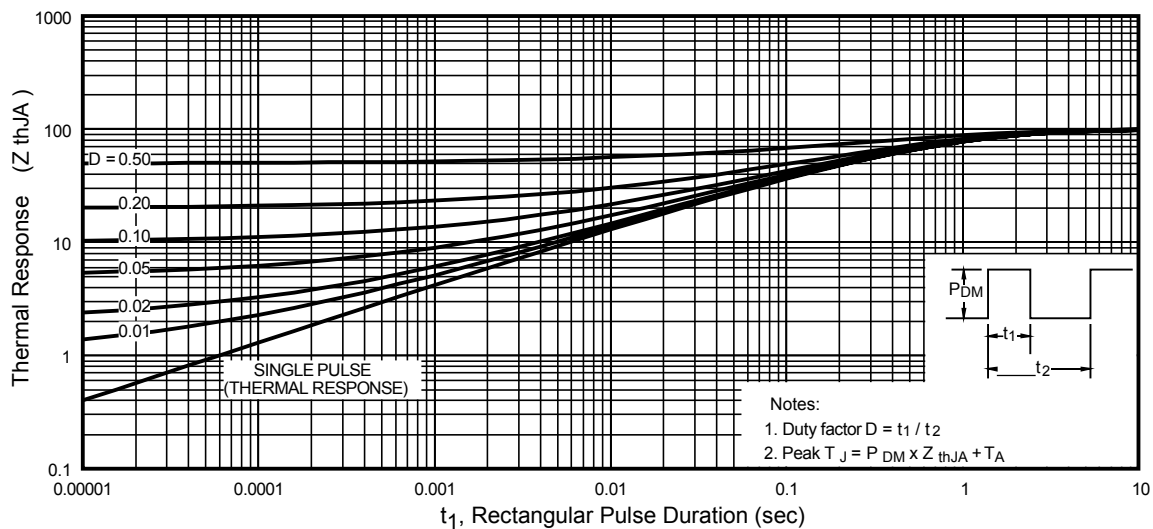
**Fig 9.** Maximum Drain Current Vs. Case Temperature



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

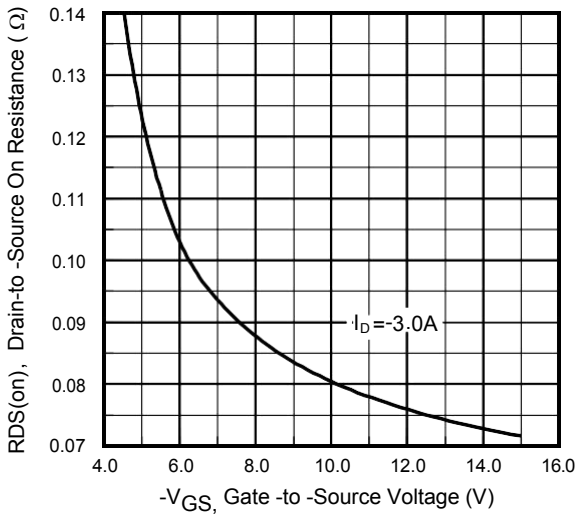


**Fig 10b.** Switching Time Waveforms

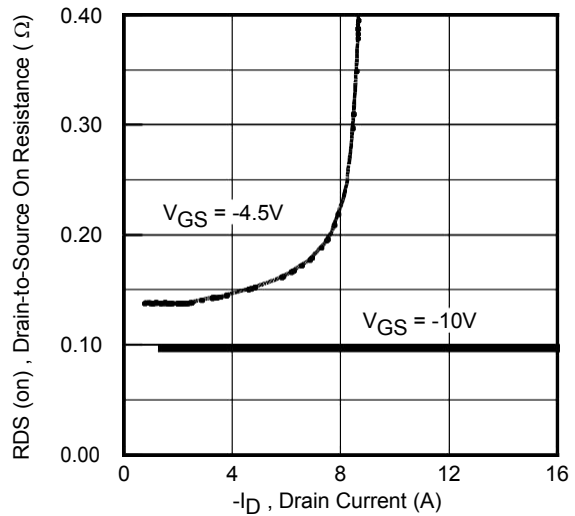


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

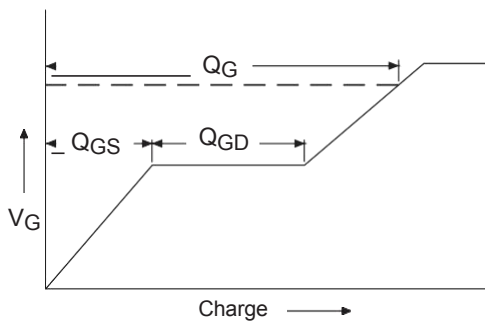
P-Channel Power MOSFET



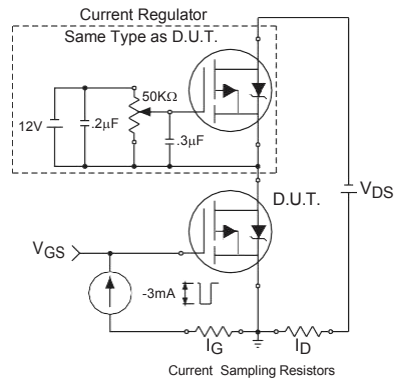
**Fig 11.** Typical On-Resistance Vs. Gate Voltage



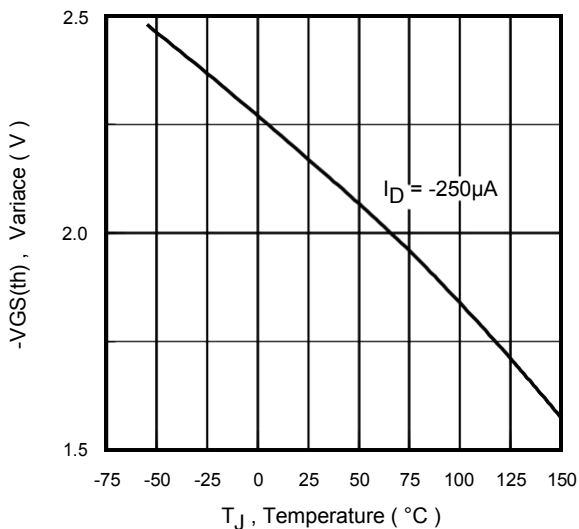
**Fig 12.** Typical On-Resistance Vs. Drain Current



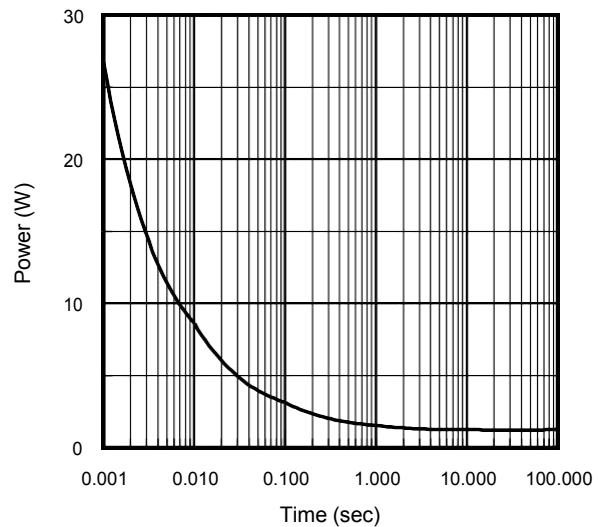
**Fig 13a.** Basic Gate Charge Waveform



**Fig 13b.** Gate Charge Test Circuit

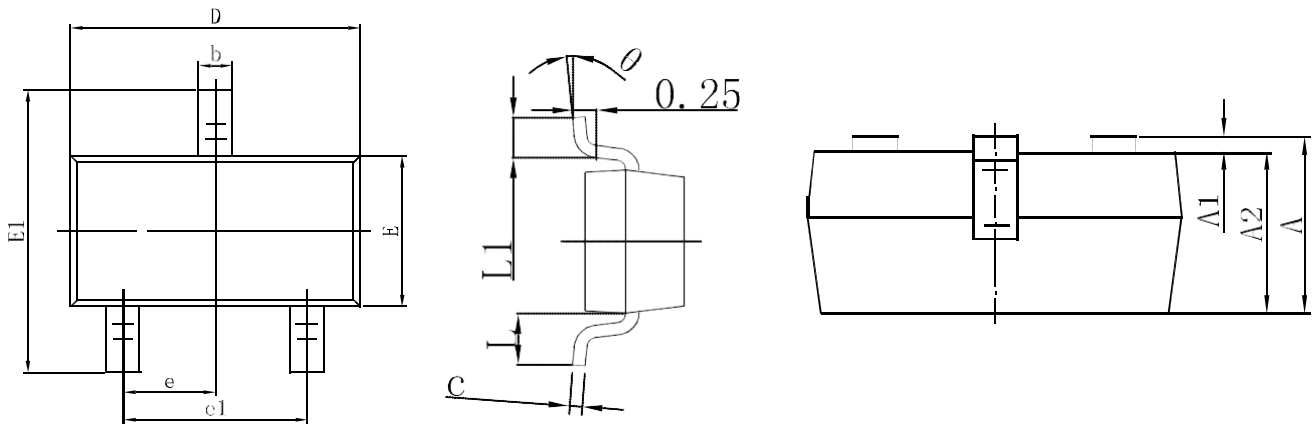


**Fig 14.** Threshold Voltage Vs. Temperature



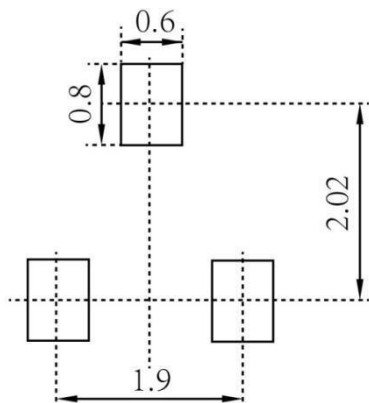
**Fig 15.** Typical Power Vs. Time

**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**

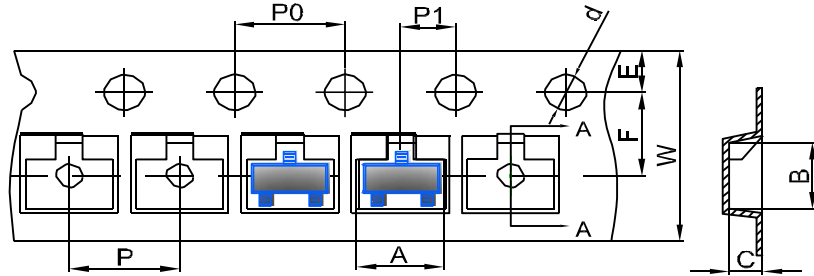


**Note:**

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

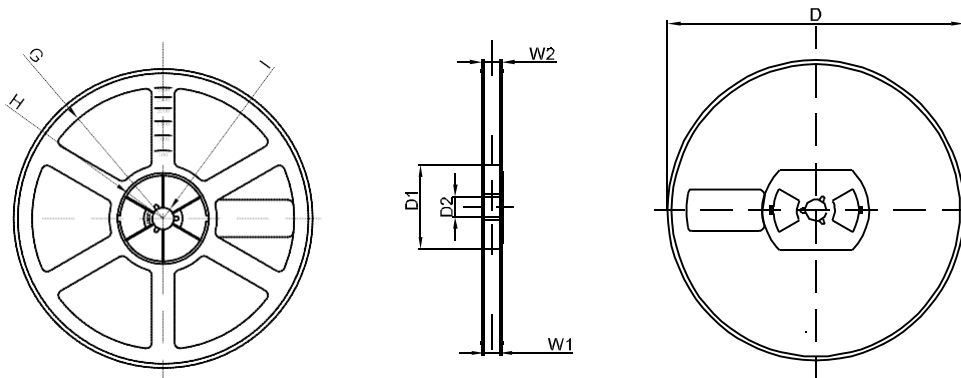


DIMENSIONS ARE IN MILLIMETER										
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

### 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