

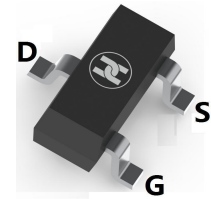
P-Channel Power MOSFET

FEATURES

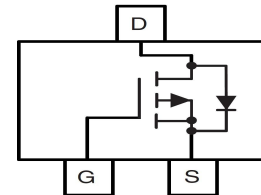
- Generation V Technology
- Ultra Low On-Resistance
- Low Profile (<1.1mm)
- Fast Switching

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/ $^\circ\text{C}$
V_{GS}	Gate-to-Source Voltage	± 20	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	$^\circ\text{C}$
$R_{\theta JA}$	Maximum Junction-to-Ambient ③	100	$^\circ\text{C}/\text{W}$

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/ $^\circ\text{C}$	Reference to 25°C , $I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	98	m Ω	$V_{GS} = -10\text{V}, I_D = -3.0\text{A}$ 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	μA	$V_{DS} = -24\text{V}, V_{GS} = 0\text{V}$
		—	—	-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, $t \leq 5\text{sec}$.

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Typical Characteristics

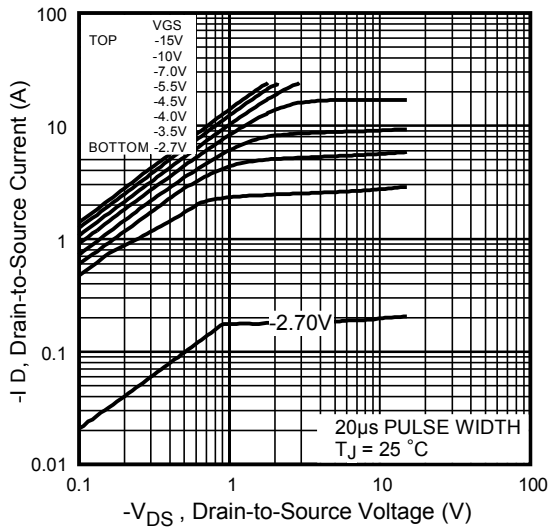


Fig 1. Typical Output Characteristics

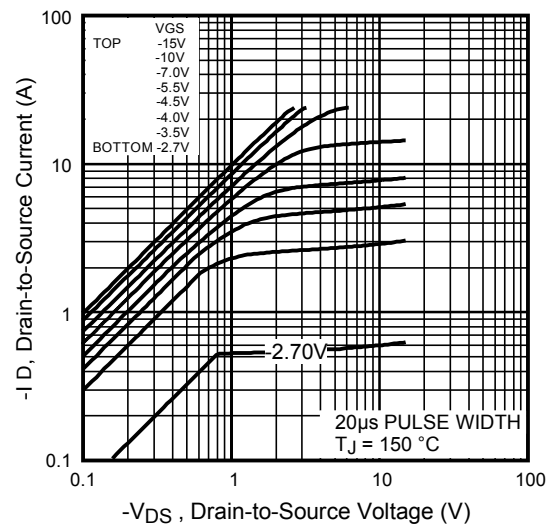


Fig 2. Typical Output Characteristics

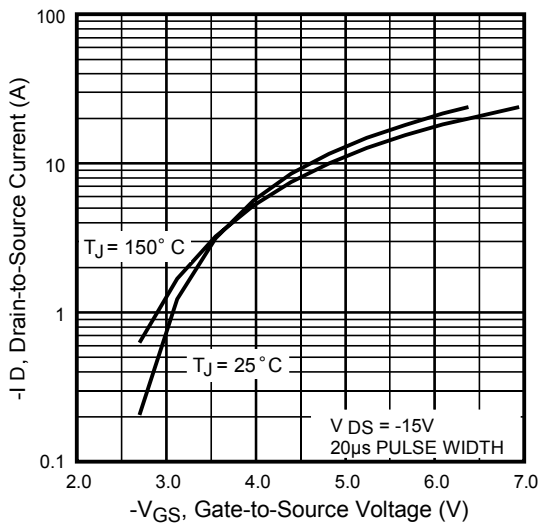


Fig 3. Typical Transfer Characteristics

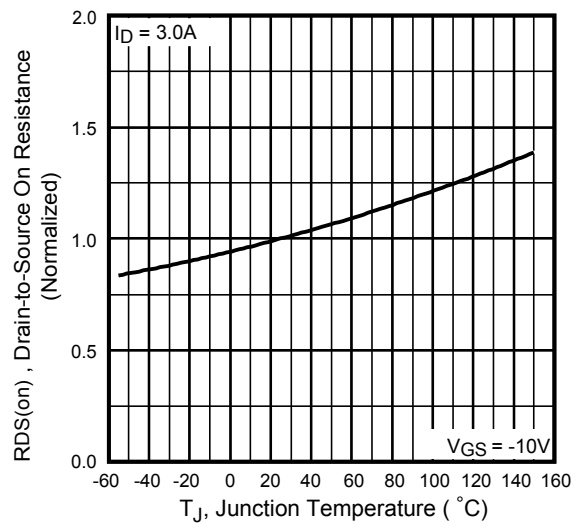


Fig 4. Normalized On-Resistance Vs. Temperature

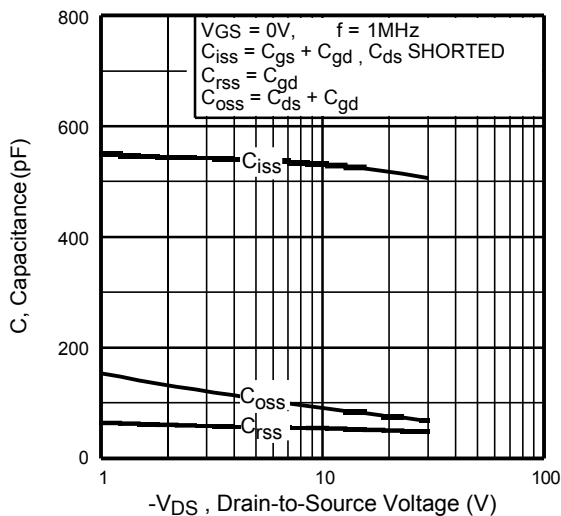


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

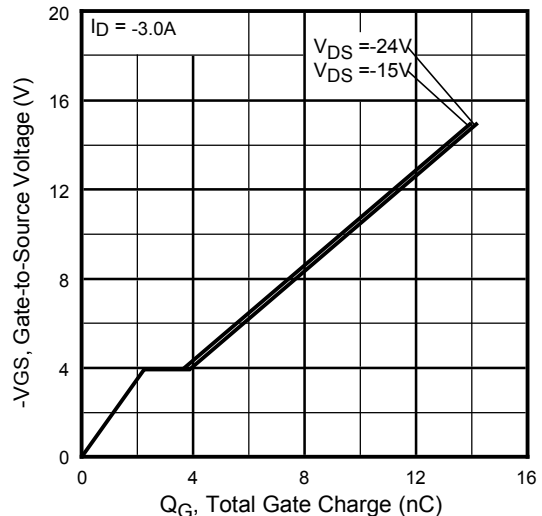


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

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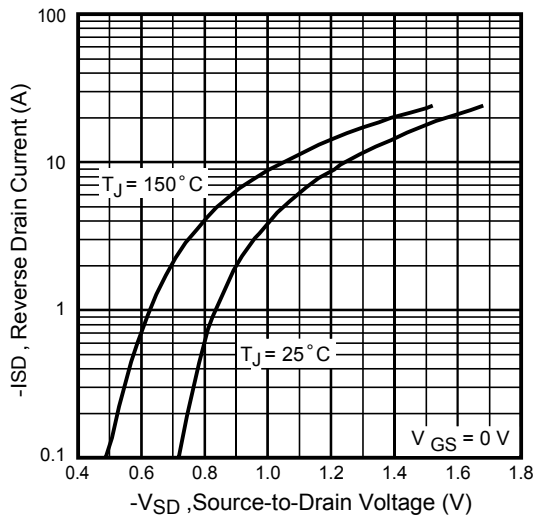


Fig 7. Typical Source-Drain Diode Forward Voltage

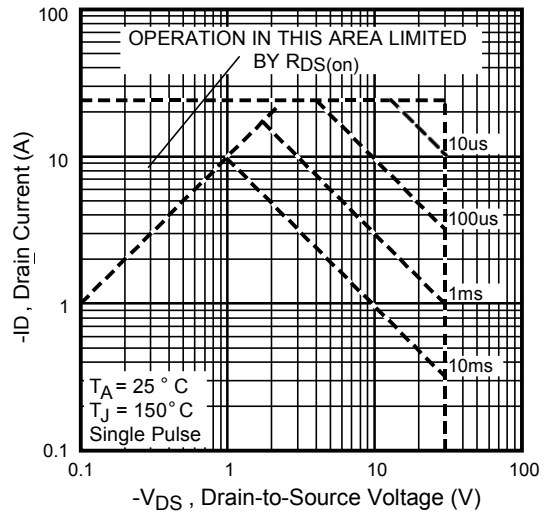


Fig 8. Maximum Safe Operating Area

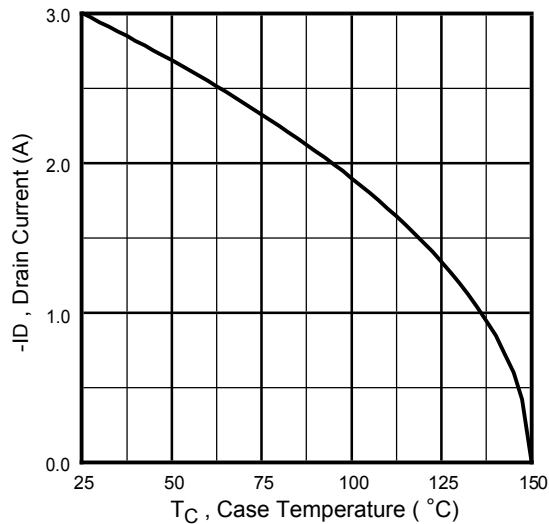


Fig 9. Maximum Drain Current Vs. Case Temperature

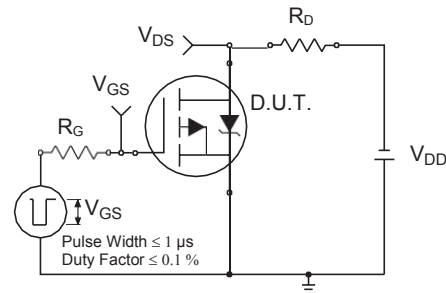


Fig 10a. Switching Time Test Circuit

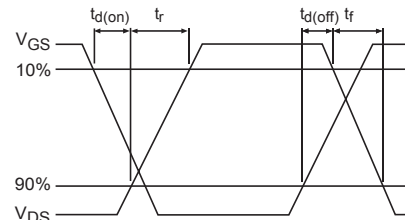


Fig 10b. Switching Time Waveforms

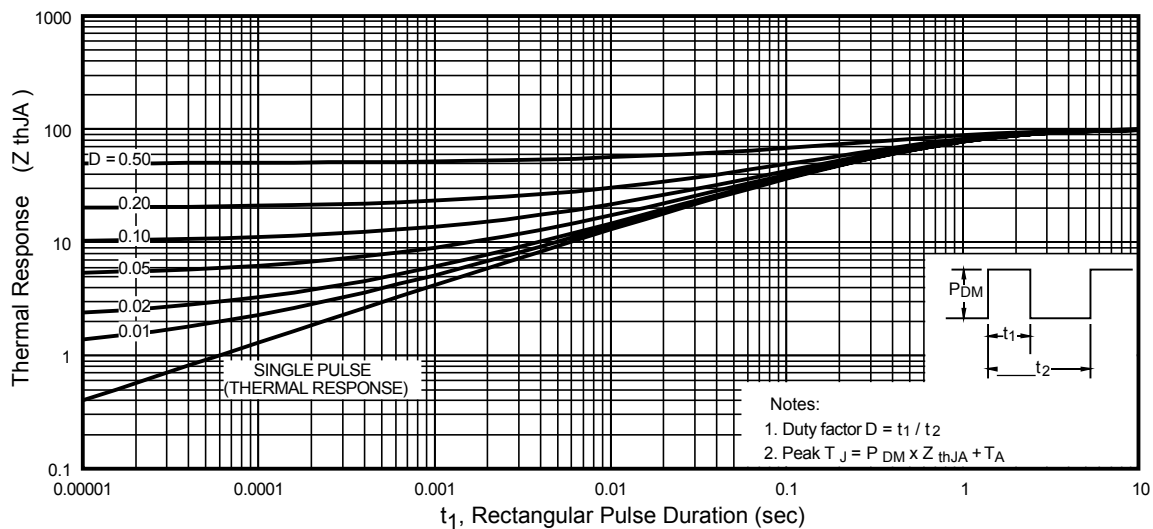


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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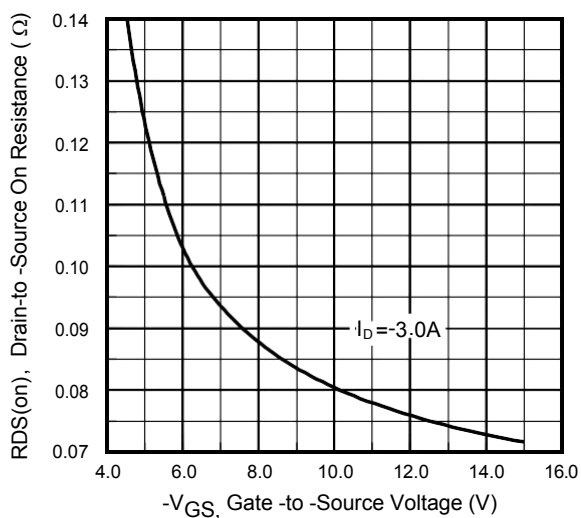


Fig 11. Typical On-Resistance Vs. Gate Voltage

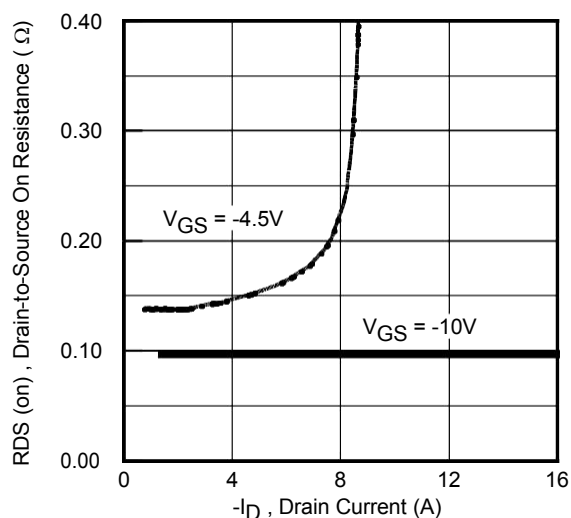


Fig 12. Typical On-Resistance Vs. Drain Current

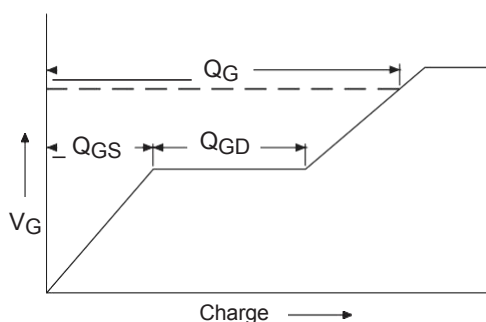


Fig 13a. Basic Gate Charge Waveform

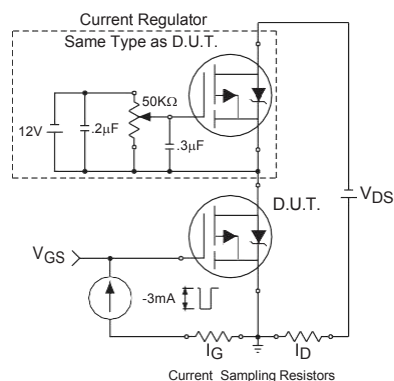


Fig 13b. Gate Charge Test Circuit

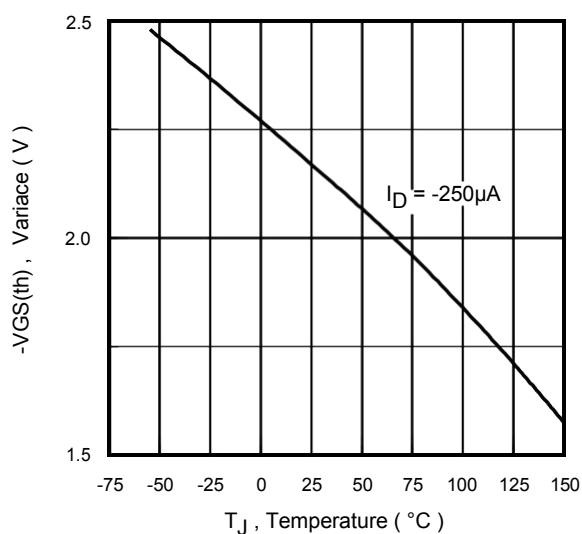


Fig 14. Threshold Voltage Vs. Temperature

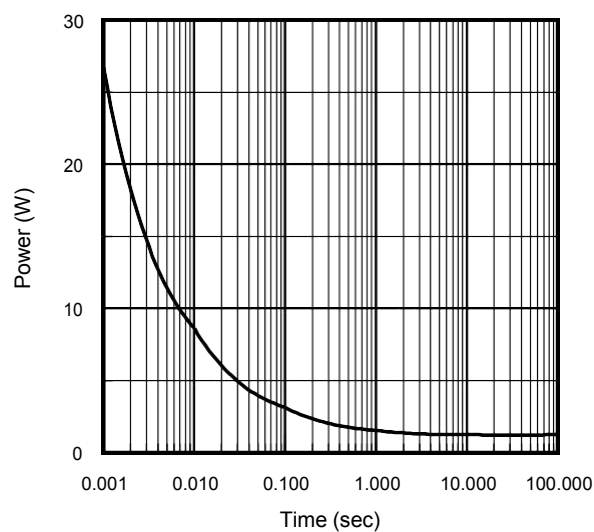
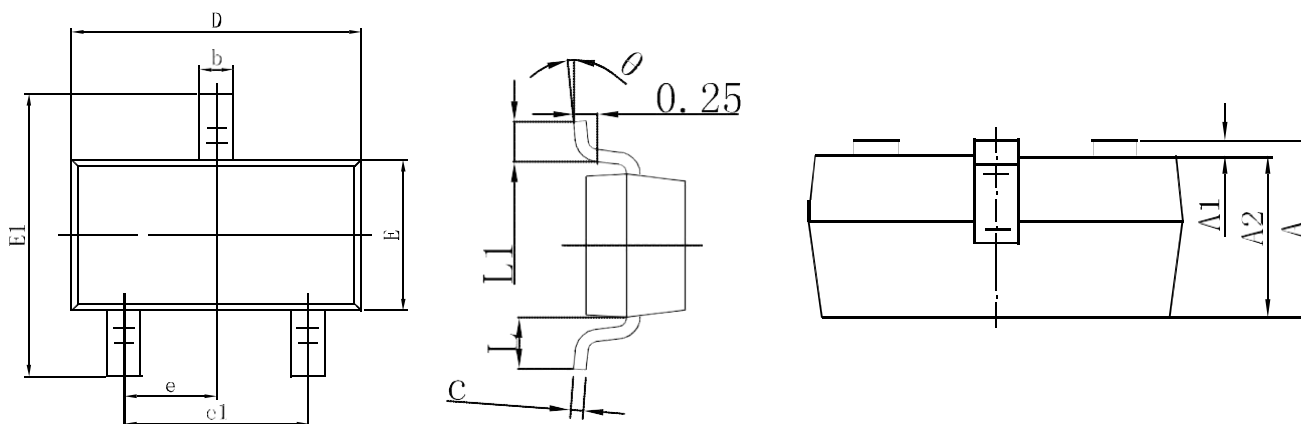
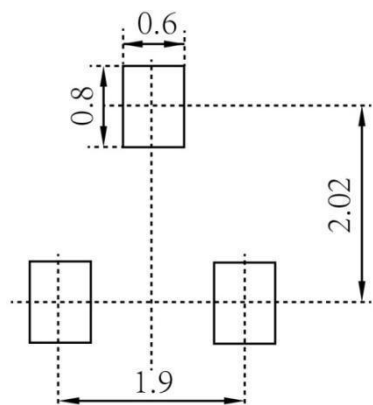


Fig 15. Typical Power Vs. Time

SOT-23 Package Outline Dimensions


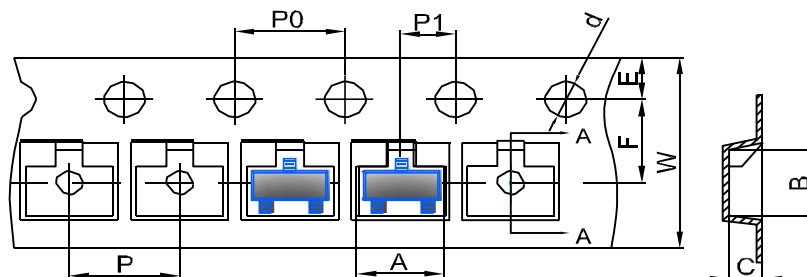
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		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: $\pm 0.05\text{mm}$
3. The pad layout is for reference purposes only

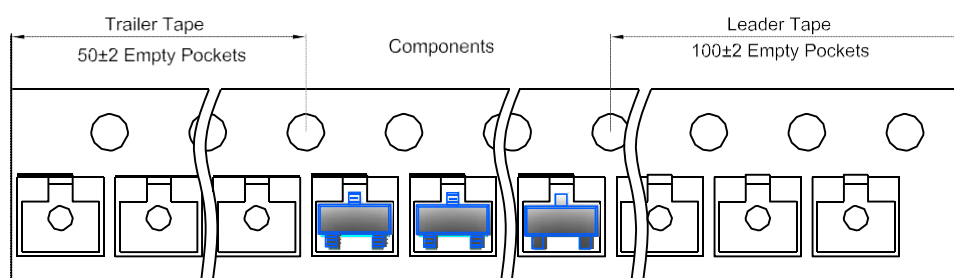
SOT-23 Tape and Reel

SOT-23 Embossed Carrier Tape

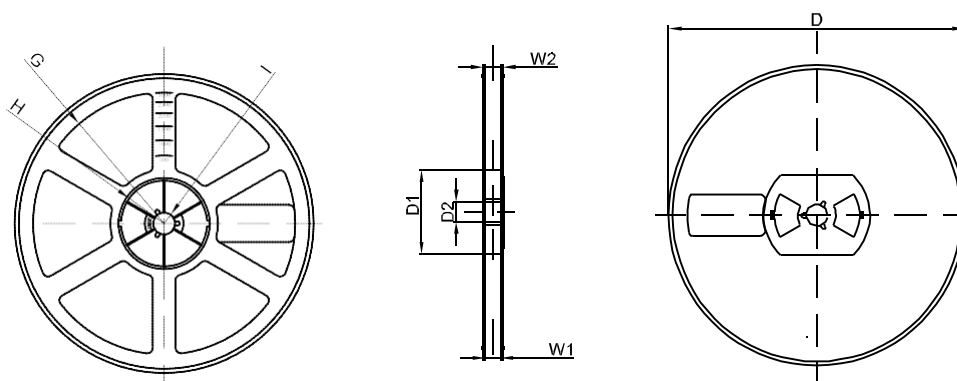


DIMENSIONS ARE IN MILLIMETER										
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

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