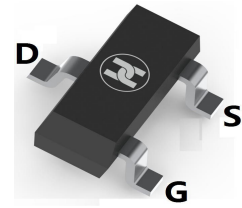
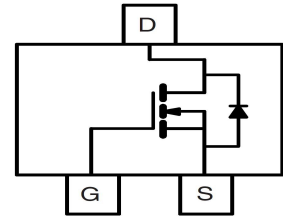


N-Channel Power MOSFET
FEATURES

- Ultra low on-resistance: $V_{DS}=30V, R_{DS(ON)} \leq 31m\Omega @ V_{GS}=4.5V, I_D=5A$
- For PWM application
- For Load switch application
- Surface Mount device


SOT-23

MECHANICAL DATA

- Case: SOT-23
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.008 grams (approximate)
- Marking: N48

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	30	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$	5.6	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$	4.5	
I_{DM}	Pulsed Drain Current	25	
$P_D @ T_A = 25^\circ\text{C}$	Maximum Power Dissipation	1.2	W
$P_D @ T_A = 70^\circ\text{C}$	Maximum Power Dissipation	0.8	
	Linear Derating Factor	0.01	
V_{GS}	Gate-to-Source Voltage	± 12	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	$^\circ\text{C}$
$R_{\theta JA}$	Junction-to-Ambient ^③	125	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient ($t < 10s$)	100	

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.02	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	21.5	28	m Ω	$V_{GS} = 10V, I_D = 5.6A$ ^②
		—	23	31		$V_{GS} = 4.5V, I_D = 5A$ ^②
$V_{GS(th)}$	Gate Threshold Voltage	0.6	0.9	1.5	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 30V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 30V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 12V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -12V$
R_G	Internal Gate Resistance	—	3.9	—	Ω	
g_{fs}	Forward Transconductance	9.5	—	—	S	$V_{DS} = 10V, I_D = 5.6A$
Q_g	Total Gate Charge	—	2.9	—	nC	$I_D = 5.6A$
Q_{gs}	Gate-to-Source Charge	—	0.13	—		$V_{DS} = 15V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	1.1	—		$V_{GS} = 4.5V$ ^②
$t_{d(on)}$	Turn-On Delay Time	—	3.3	—	ns	$V_{DD} = 15V$ ^②
t_r	Rise Time	—	4.0	—		$I_D = 1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	12	—		$R_G = 6.8\Omega$
t_f	Fall Time	—	4.9	—		$V_{GS} = 4.5V$
C_{iss}	Input Capacitance	—	270	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	32	—		$V_{DS} = 24V$
C_{rss}	Reverse Transfer Capacitance	—	21	—		$f = 1.0MHz$
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	—	—	17		
V_{SD}	Diode Forward Voltage	—	—	1.2	V	$T_J = 25^\circ\text{C}, I_S = 5.6A, V_{GS} = 0V$ ^②
t_{rr}	Reverse Recovery Time	—	8.8	13	ns	$T_J = 25^\circ\text{C}, V_R = 24V, I_F = 1.3A$
Q_{rr}	Reverse Recovery Charge	—	2.7	4.1	nC	$di/dt = 100A/\mu s$ ^②

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

^② Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.

^③ Surface mounted on 1 in square Cu board.

N-Channel Power MOSFET

Typical Characteristics

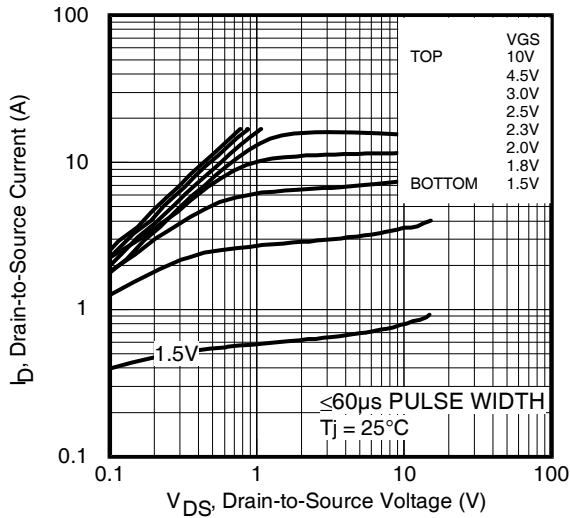


Fig 1. Typical Output Characteristics

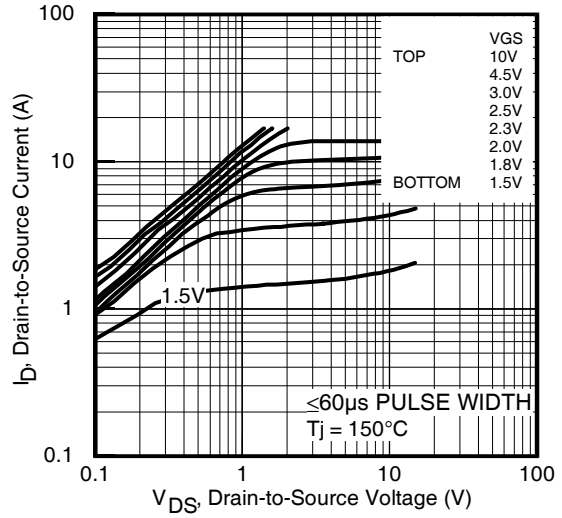


Fig 2. Typical Output Characteristics

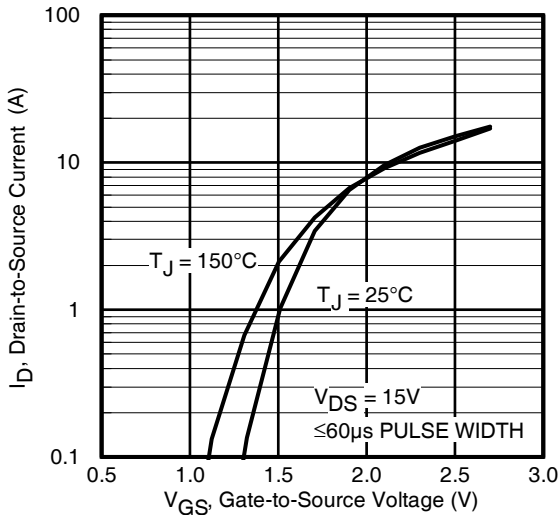


Fig 3. Typical Transfer Characteristics

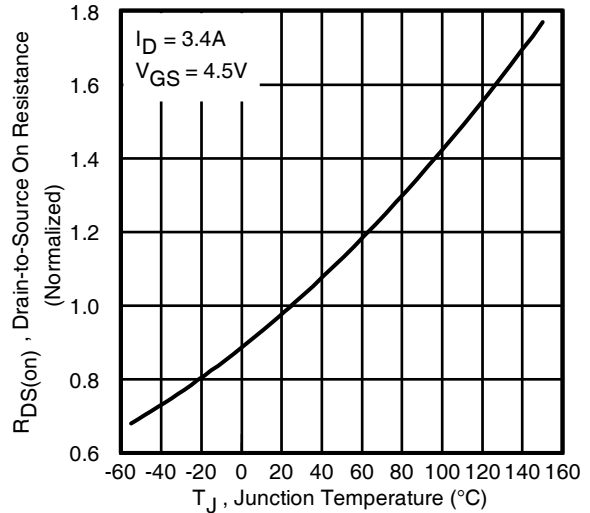


Fig 4. Normalized On-Resistance vs. Temperature

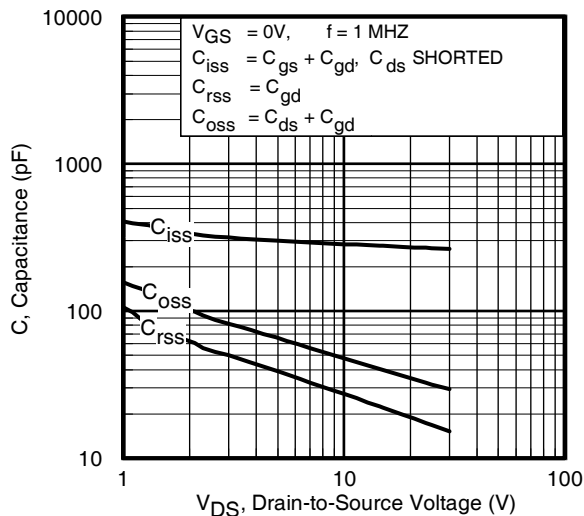


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

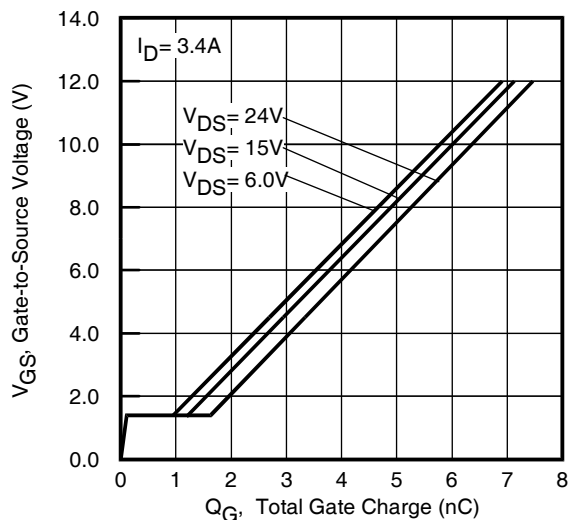


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

N-Channel Power MOSFET

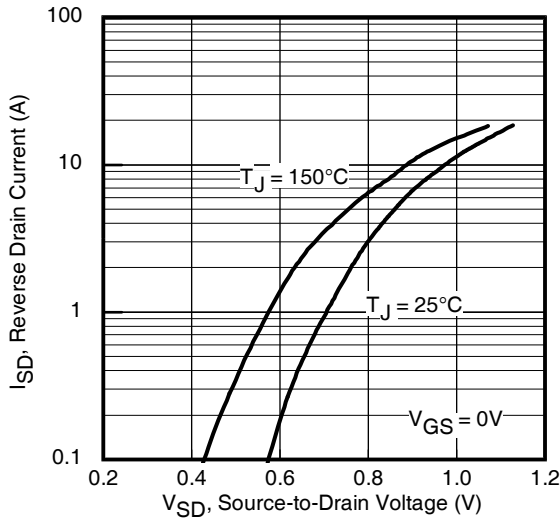


Fig 7. Typical Source-Drain Diode Forward Voltage

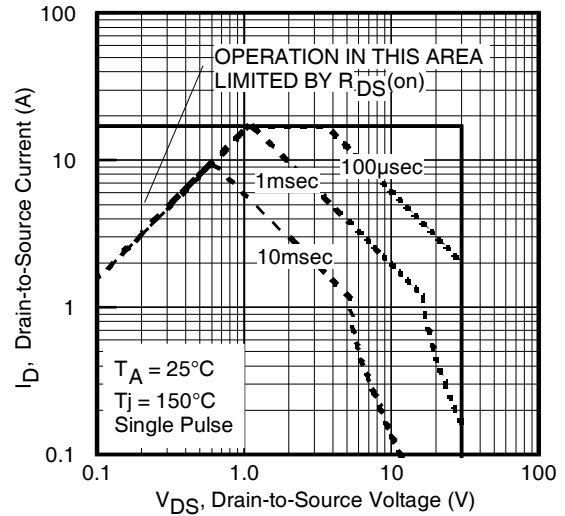


Fig 8. Maximum Safe Operating Area

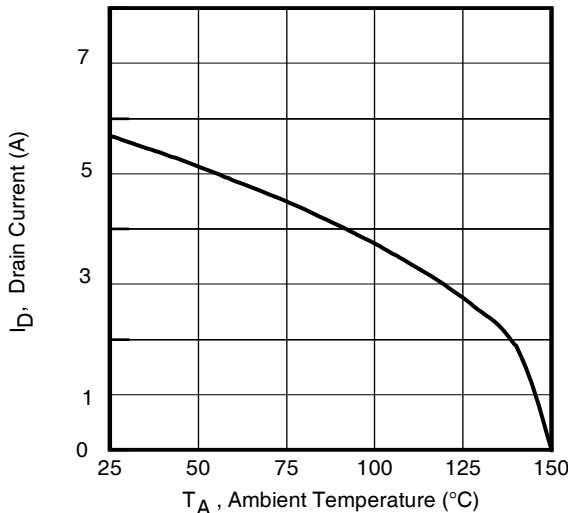


Fig 9. Maximum Drain Current vs. Ambient Temperature

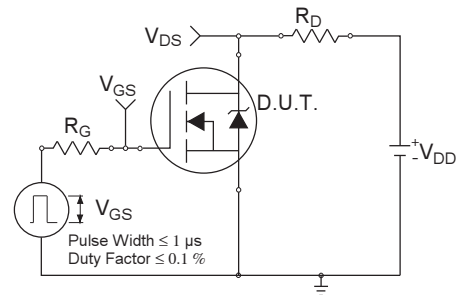


Fig 10a. Switching Time Test Circuit

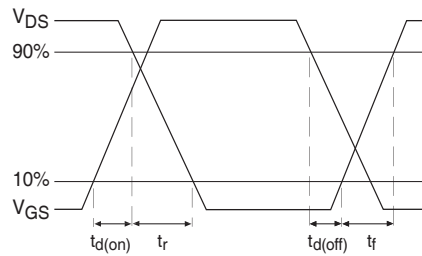


Fig 10b. Switching Time Waveforms

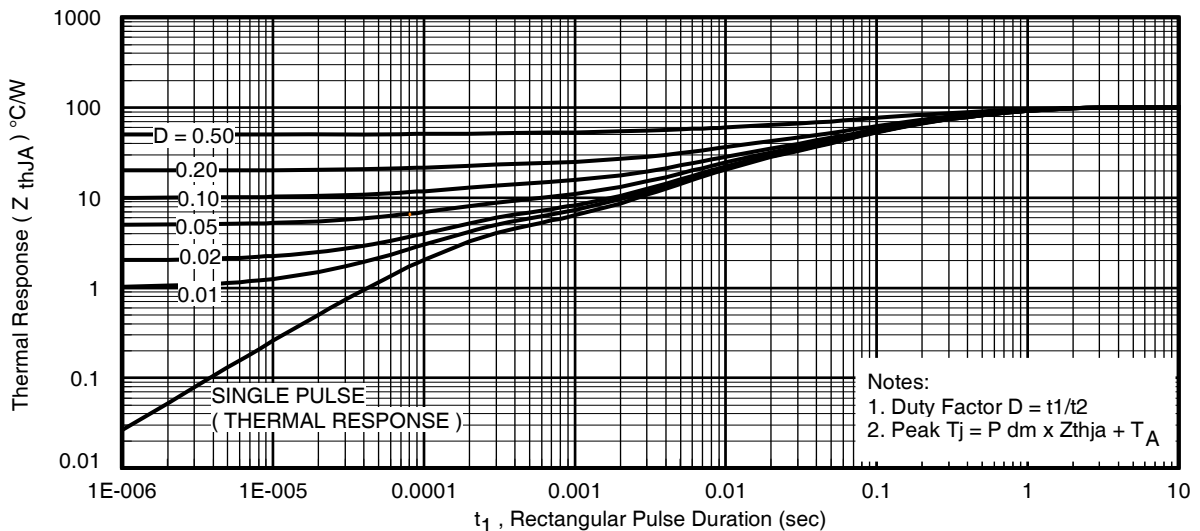


Fig 11. Typical Effective Transient Thermal Impedance, Junction-to-Ambient

N-Channel Power MOSFET

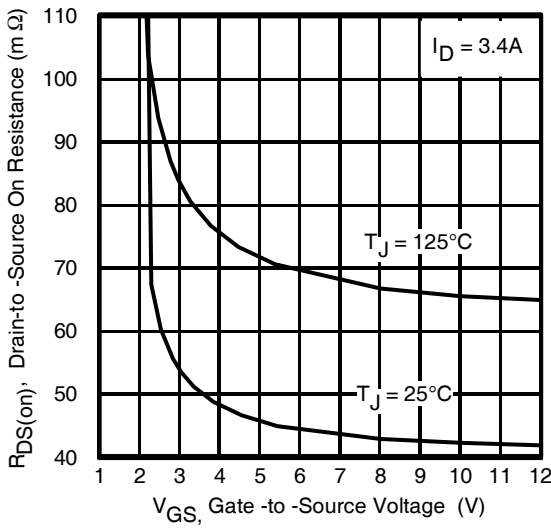


Fig 12. Typical On-Resistance vs. Gate Voltage

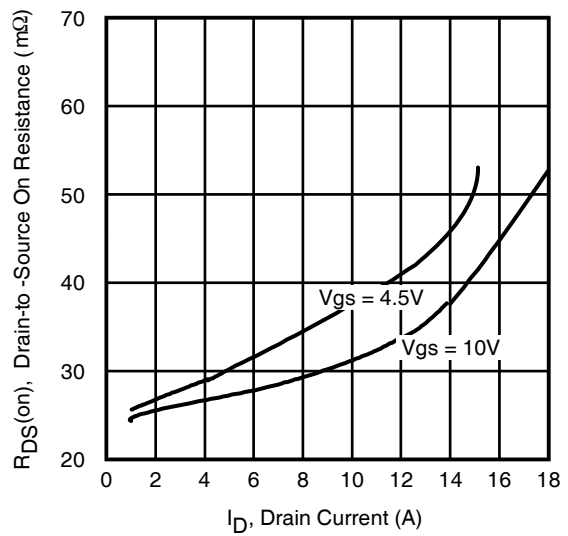


Fig 13. Typical On-Resistance vs. Drain Current

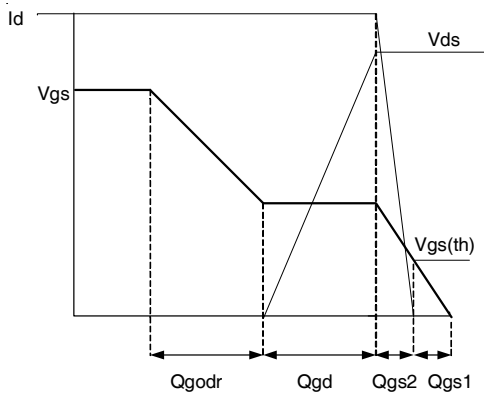


Fig 14a. Basic Gate Charge Waveform

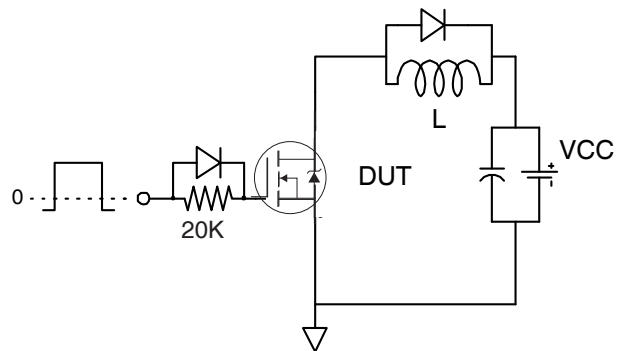


Fig 14b. Gate Charge Test Circuit

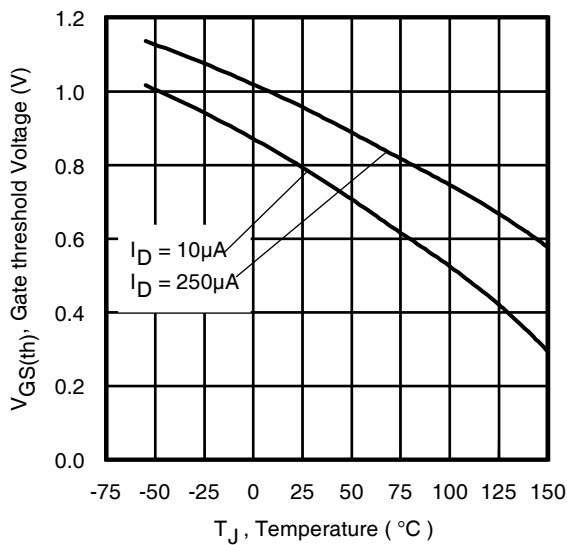


Fig 15. Typical Threshold Voltage vs. Junction Temperature

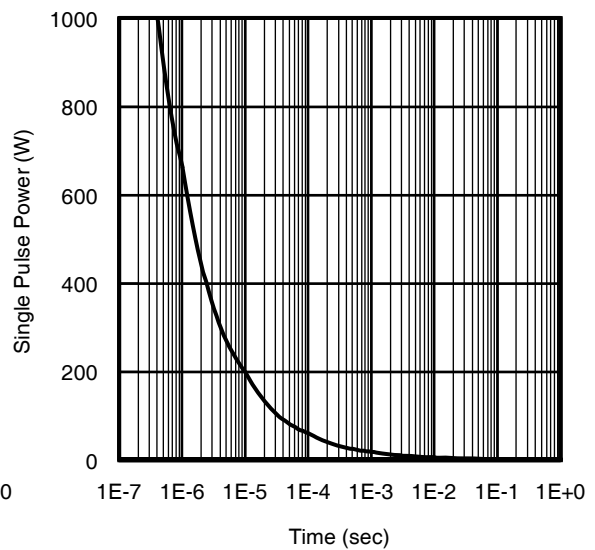
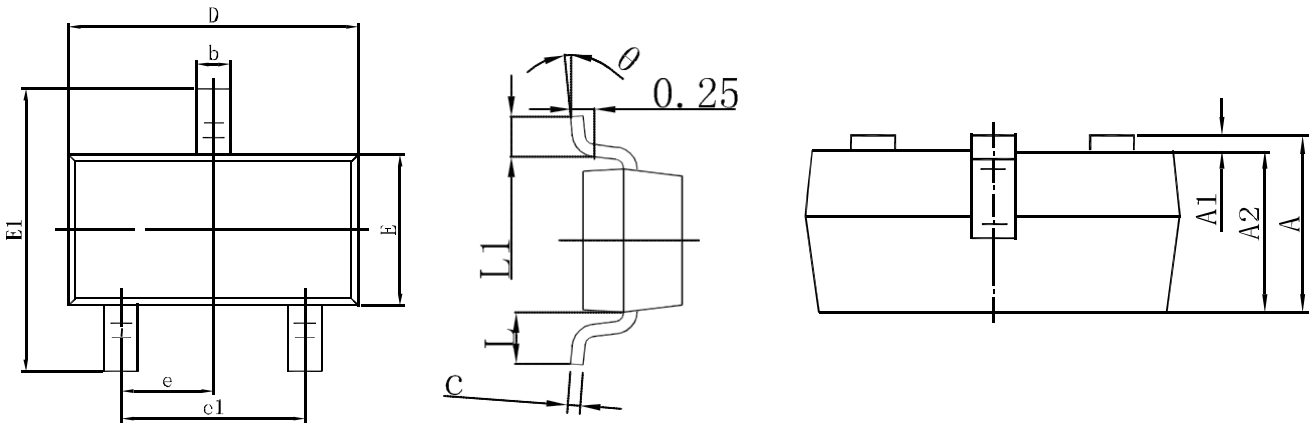
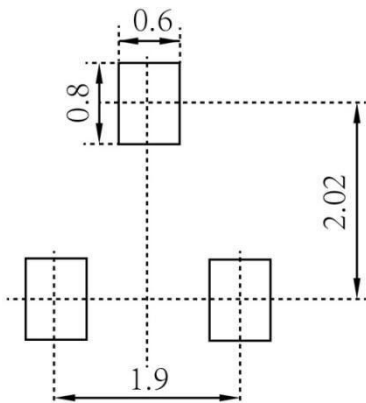


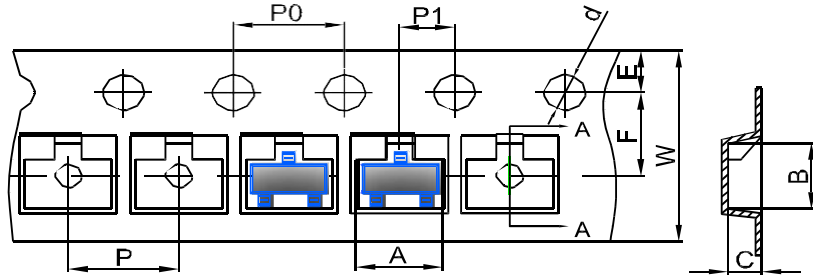
Fig 16. Typical Power vs. Time

N-Channel Power MOSFET
SOT-23 Package Outline Dimensions


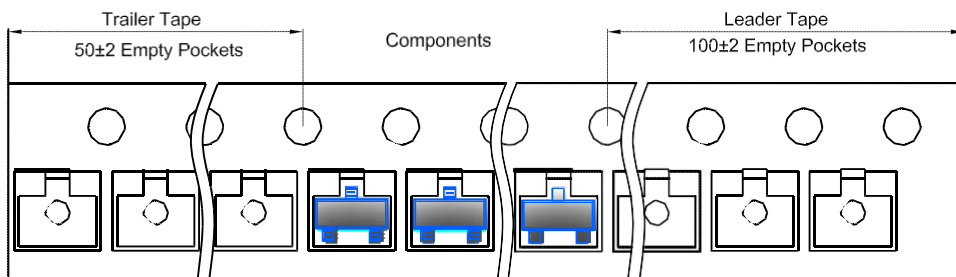
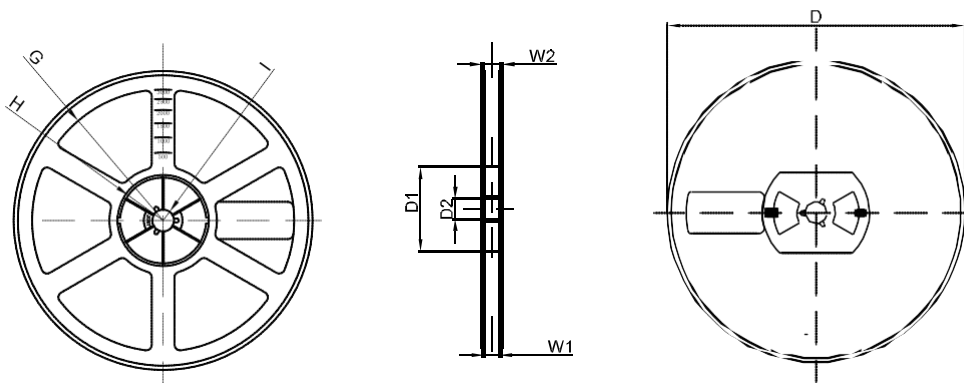
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		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