

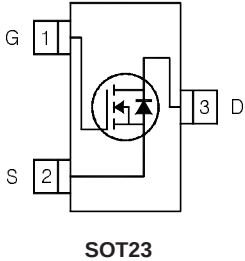
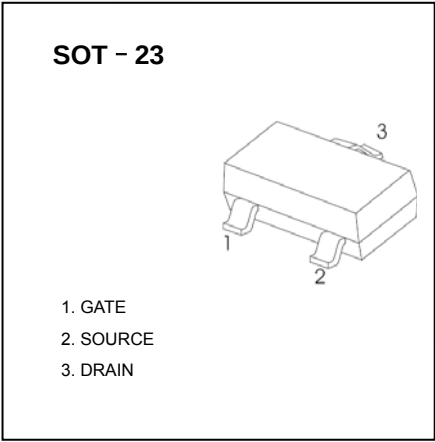
N-Channel 60 V (D-S) MOSFET

Product summary

V _{DS} (V)	R _{DS(on)} (mΩ)
60	92 at V _{GS} = 10 V
	116 at V _{GS} = 4.5 V

Features

- Industry-standard pinout
- Compatible with existing Surface Mount Techniques
- compliant containing no lead, no bromide and no halogen
- Industrial qualification



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V _{DS}	Drain-Source Voltage	60	V
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ 10V	2.7	A
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V	2.1	
I _{DM}	Pulsed Drain Current	11	
P _D @ T _A = 25°C	Maximum Power Dissipation	1.25	W
P _D @ T _A = 70°C	Maximum Power Dissipation	0.80	
	Linear Derating Factor	0.01	W/°C
V _{GS}	Gate-to-Source Voltage	± 16	V
T _J , T _{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
R _{θJA}	Junction-to-Ambient ③	—	100	°C/W
R _{θJA}	Junction-to-Ambient (t<10s) ④	—	99	

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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	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.06	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	98	116	$m\Omega$	$V_{GS} = 4.5V, I_D = 2.2A$ ②
		—	78	92		$V_{GS} = 10V, I_D = 2.7A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	2.5	V	$V_{DS} = V_{GS}, I_D = 25\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 60V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 60V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
R_G	Internal Gate Resistance	—	1.6	—	Ω	
g_{fs}	Forward Transconductance	7.6	—	—	S	$V_{DS} = 25V, I_D = 2.7A$
Q_g	Total Gate Charge	—	2.5	—	nC	$I_D = 2.7A$
Q_{gs}	Gate-to-Source Charge	—	0.7	—		$V_{DS} = 30V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	1.3	—		$V_{GS} = 4.5V$ ②
$t_{d(on)}$	Turn-On Delay Time	—	5.4	—	ns	$V_{DD} = 30V$ ②
t_r	Rise Time	—	6.3	—		$I_D = 1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	6.8	—		$R_G = 6.8\Omega$
t_f	Fall Time	—	4.2	—		$V_{GS} = 4.5V$
C_{iss}	Input Capacitance	—	290	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	37	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	21	—		$f = 1.0\text{MHz}$

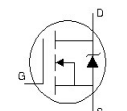
Source - Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	1.6	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	11		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 2.7A, V_{GS} = 0V$ ②
t_{rr}	Reverse Recovery Time	—	14	21	ns	$T_J = 25^\circ\text{C}, V_R = 30V, I_F = 1.6A$
Q_{rr}	Reverse Recovery Charge	—	13	20	nC	$di/dt = 100A/\mu s$ ②

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 60 V (D-S) MOSFET

Typical Characteristics

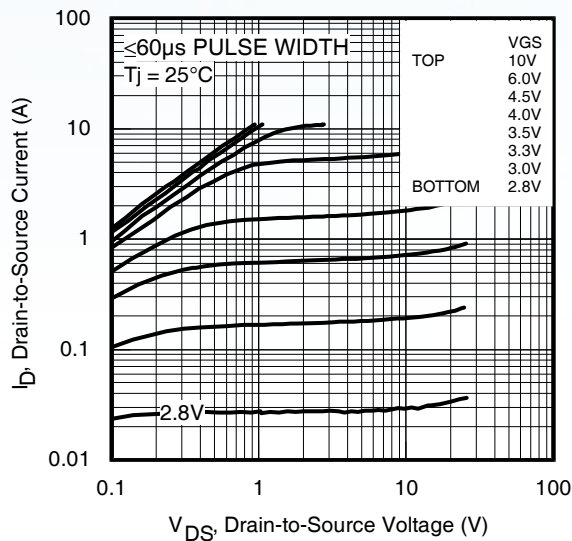


Fig 1. Typical Output Characteristics

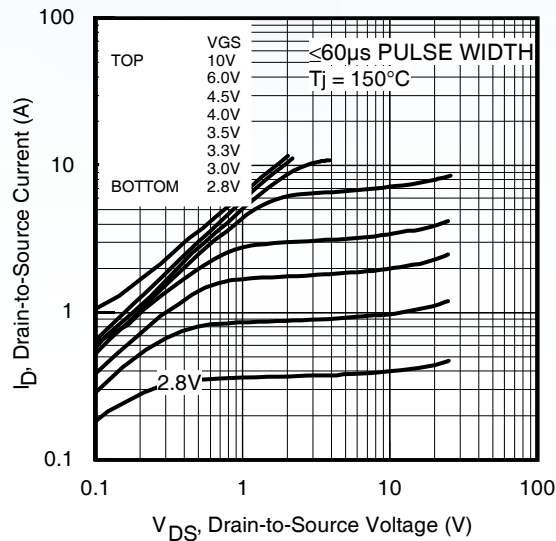


Fig 2. Typical Output Characteristics

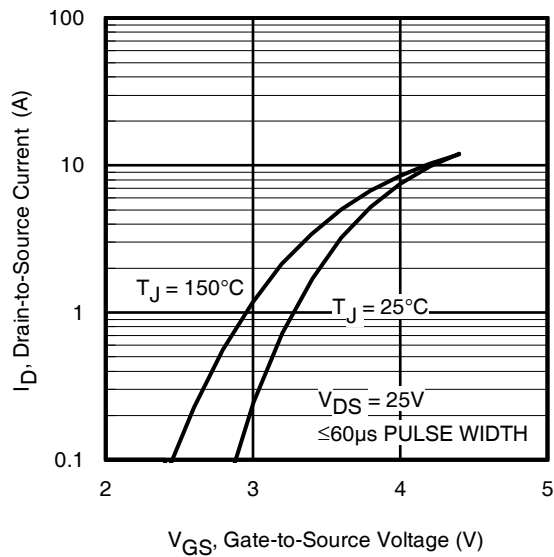


Fig 3. Typical Transfer Characteristics

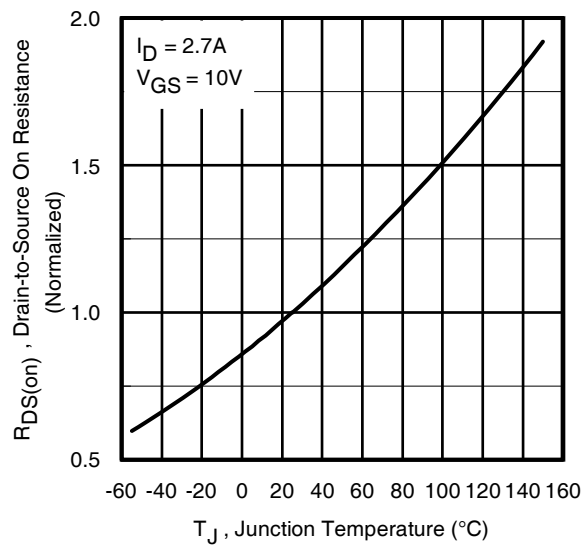


Fig 4. Normalized On-Resistance vs. Temperature

N-Channel 60 V (D-S) MOSFET

Typical Characteristics

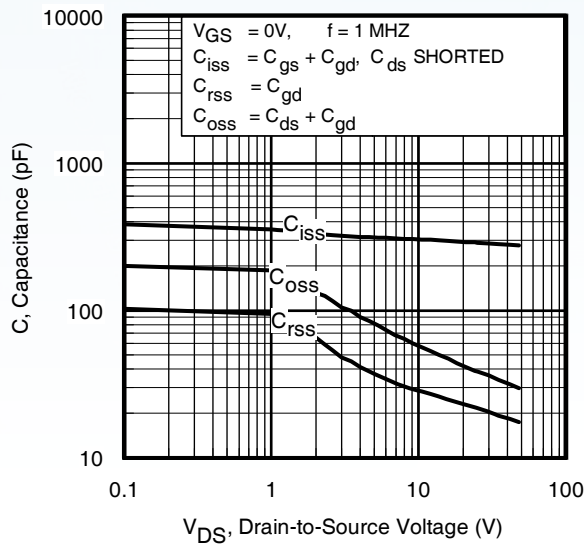


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

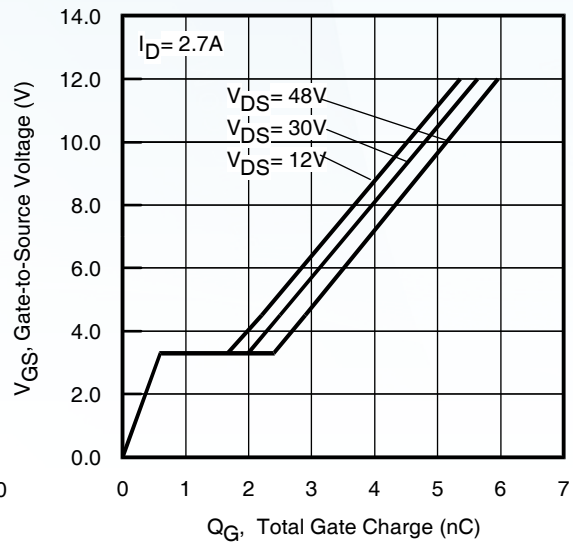


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

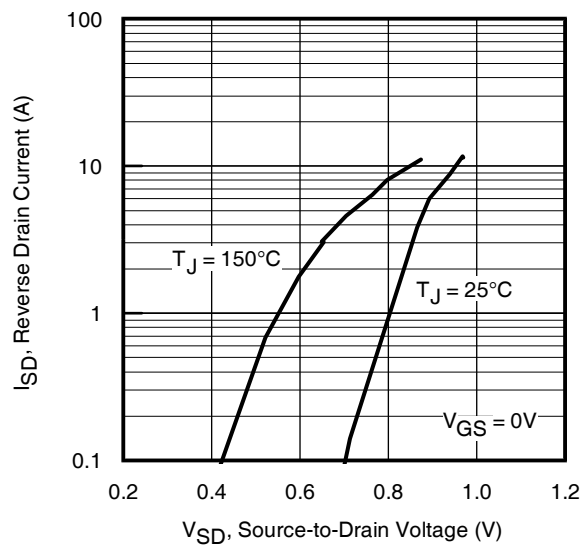


Fig 7. Typical Source-Drain Diode Forward Voltage

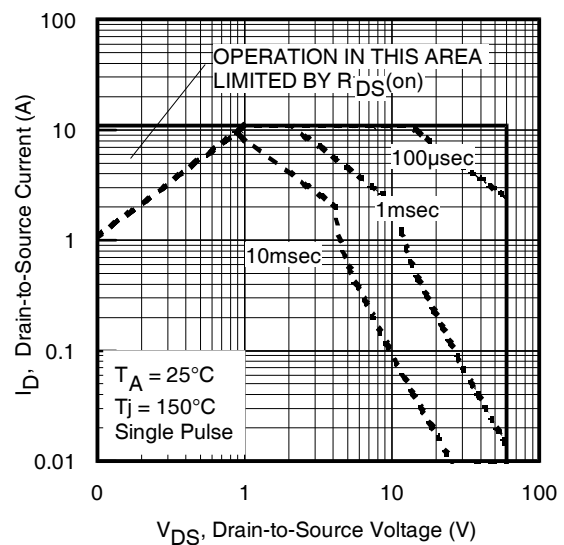


Fig 8. Maximum Safe Operating Area

N-Channel 60 V (D-S) MOSFET

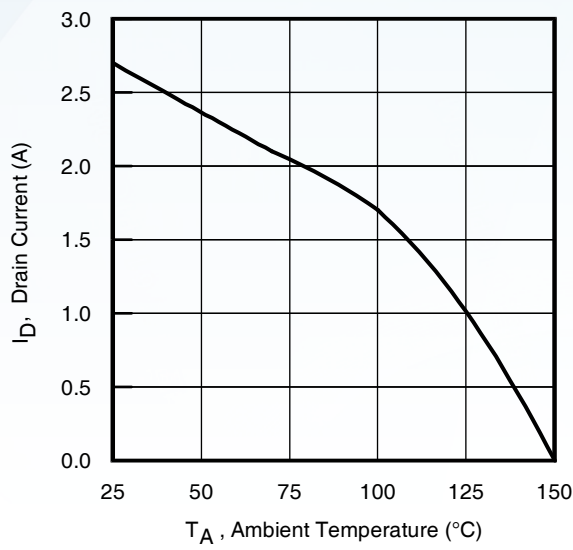


Fig 9. Maximum Drain Current vs. Ambient Temperature

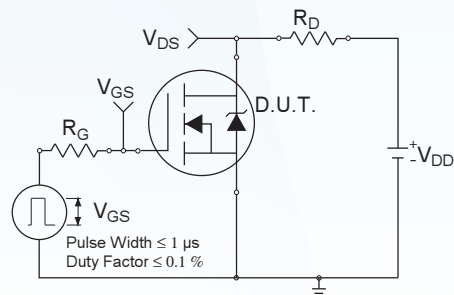


Fig 10a. Switching Time Test Circuit

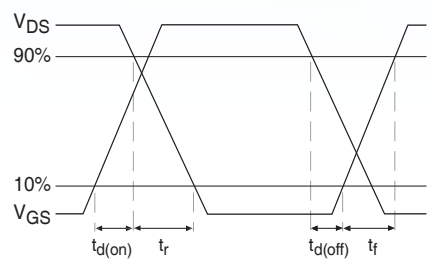


Fig 10b. Switching Time Waveforms

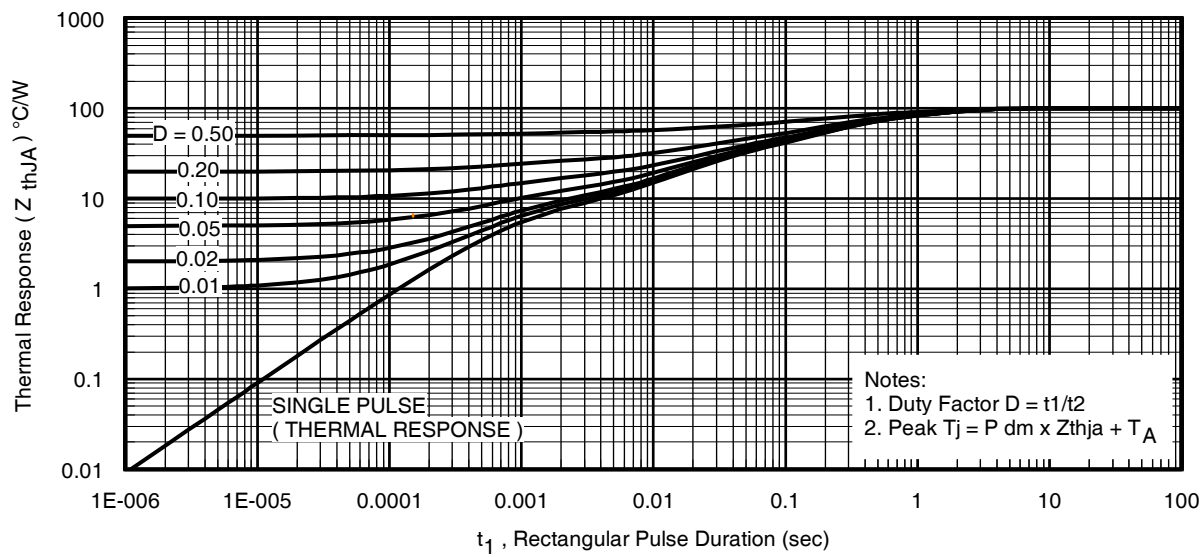


Fig 11. Typical Effective Transient Thermal Impedance, Junction-to-Ambient

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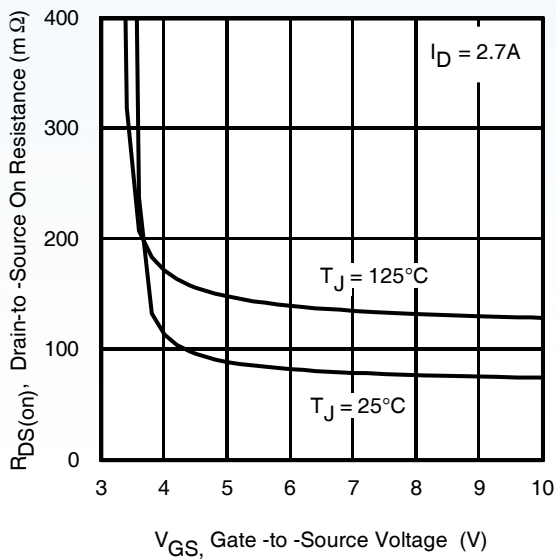


Fig 12. Typical On-Resistance vs. Gate Voltage

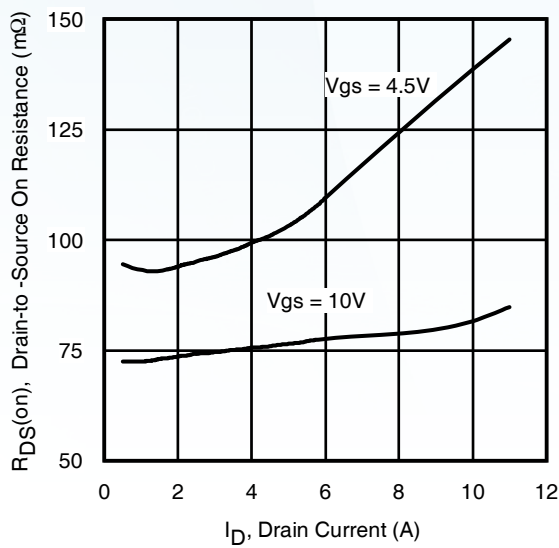


Fig 13. Typical On-Resistance vs. Drain Current

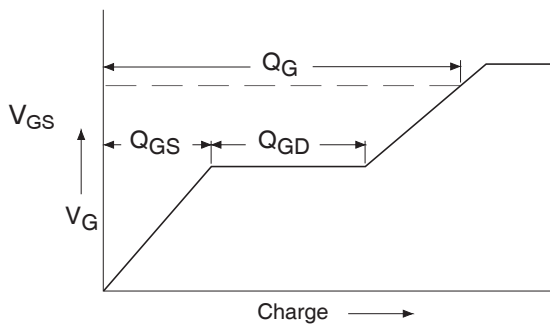


Fig 14a. Basic Gate Charge Waveform

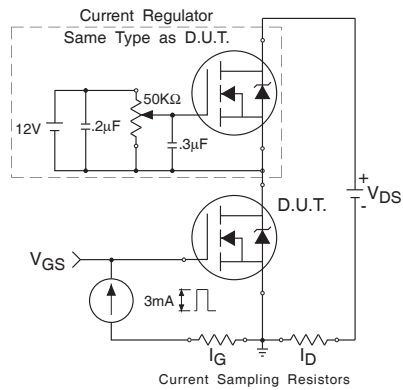


Fig 14b. Gate Charge Test Circuit

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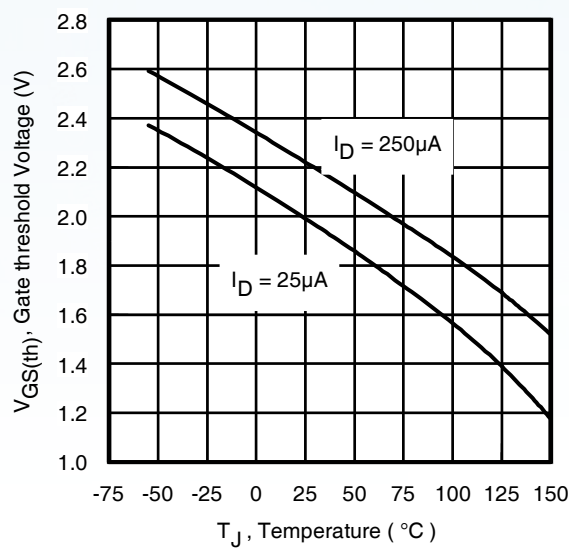


Fig 15. Typical Threshold Voltage vs. Junction Temperature

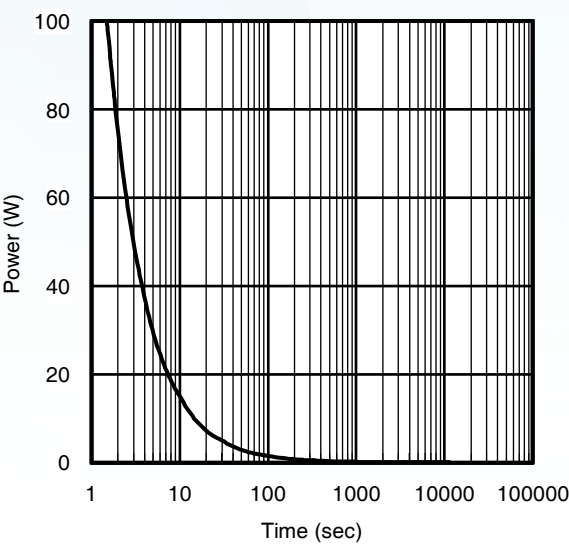
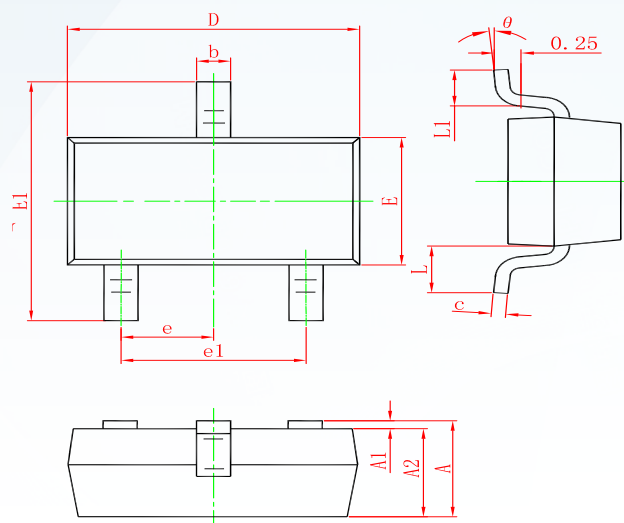


Fig 16. Typical Power vs. Time

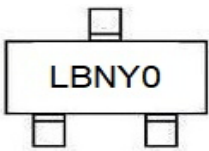
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SOT-23 PACKAGE OUTLINE DIMENSIONS



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°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
IRLML0060	SOT-23	3000	Tape and reel

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