

N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
40	0.0135 at V _{GS} = 10 V	8.5	6.2 nC
	0.017 at V _{GS} = 4.5 V	6.5	

FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

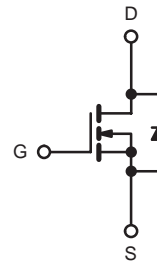
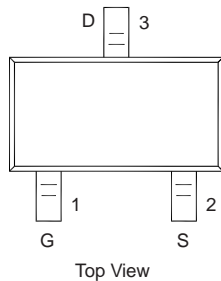


RoHS
COMPLIANT

APPLICATIONS

- Load Switch
- Notebook Adaptor Switch
- DC/DC Converter

(SOT-23-3L)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V _{DS}	40	V
Gate-Source Voltage		V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	8.5 ^a	A
	T _C = 70 °C		6.3	
	T _A = 25 °C		6.5	
	T _A = 70 °C		4.8	
Pulsed Drain Current		I _{DM}	32	
Continuous Source-Drain Diode Current	T _C = 25 °C	I _S	8.5	
	T _A = 25 °C		1.1 ^{b, c}	
Maximum Power Dissipation	T _C = 25 °C	P _D	3.4	W
	T _C = 70 °C		2.17	
	T _A = 25 °C		2.1 ^{b, c}	
	T _A = 70 °C		1.34 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) ^{d, e}			260	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	t ≤ 5 s	R _{thJA}	-	65	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	-	30	

Notes:

- Package limited
- Surface Mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 130 °C/W.

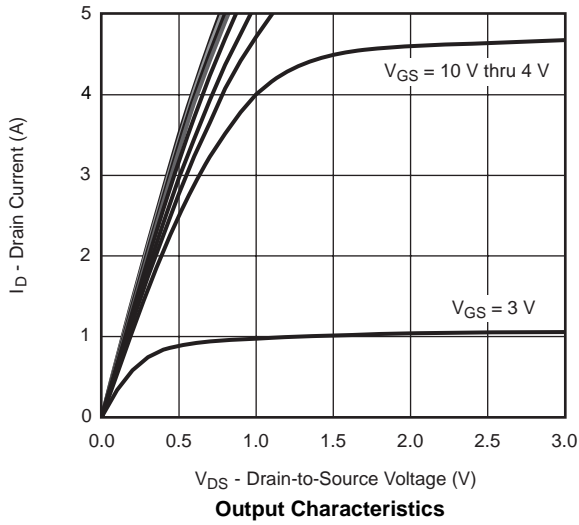
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		31		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 32\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	8.5			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 3\text{ A}$		0.0135	0.016	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 2\text{ A}$		0.017	0.025	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 3\text{ A}$		30		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		2140		μF
Output Capacitance	C_{oss}			305		
Reverse Transfer Capacitance	C_{rss}			33		
Total Gate Charge	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, I_D = 3\text{ A}$		6.2		nC
		$V_{DS} = 20\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 2\text{ A}$		4.5		
Gate-Source Charge	Q_{gs}			3		
Gate-Drain Charge	Q_{gd}		5.5			
Gate Resistance	R_g	$f = 1\text{ MHz}$		4.5		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 5.6\text{ }\Omega$ $I_D \cong 2.7\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		8.5		ns
Rise Time	t_r			15		
Turn-Off Delay Time	$t_{d(off)}$			18		
Fall Time	t_f			25		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 5.6\text{ }\Omega$ $I_D \cong 2.7\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		5		
Rise Time	t_r			15		
Turn-Off Delay Time	$t_{d(off)}$			12		
Fall Time	t_f			20		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			8.5	A
Pulse Diode Forward Current	I_{SM}				32	
Body Diode Voltage	V_{SD}	$I_S = 2.7\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 2.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		58		ns
Body Diode Reverse Recovery Charge	Q_{rr}			5		nC
Reverse Recovery Fall Time	t_a			6		ns
Reverse Recovery Rise Time	t_b			4		

Notes:

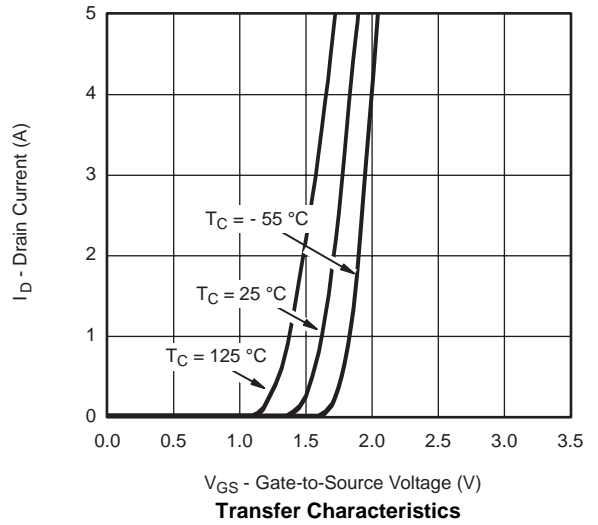
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

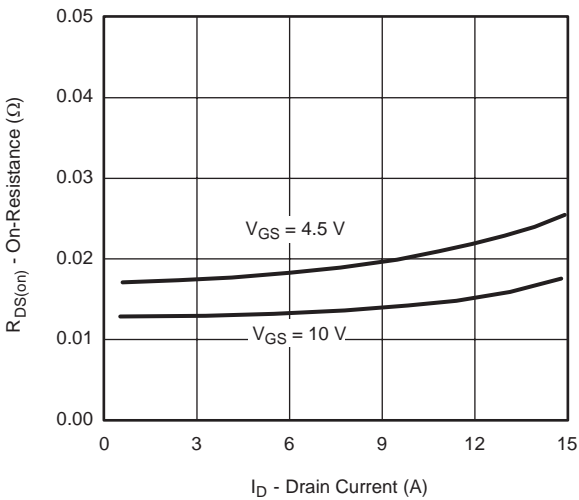
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



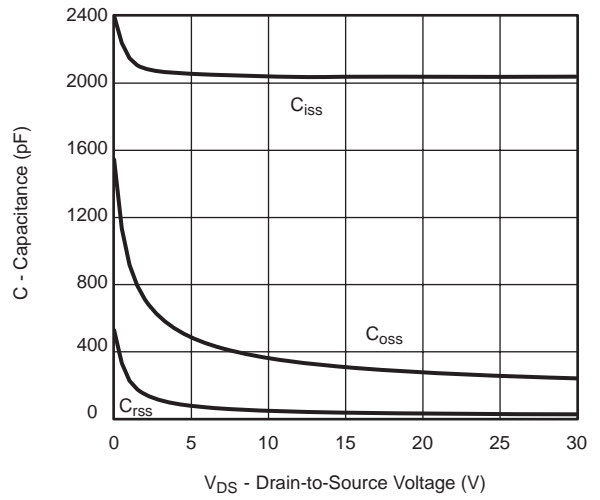
Output Characteristics



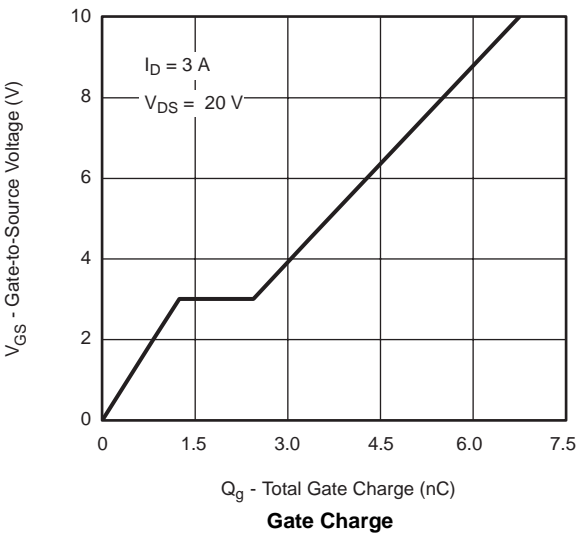
Transfer Characteristics



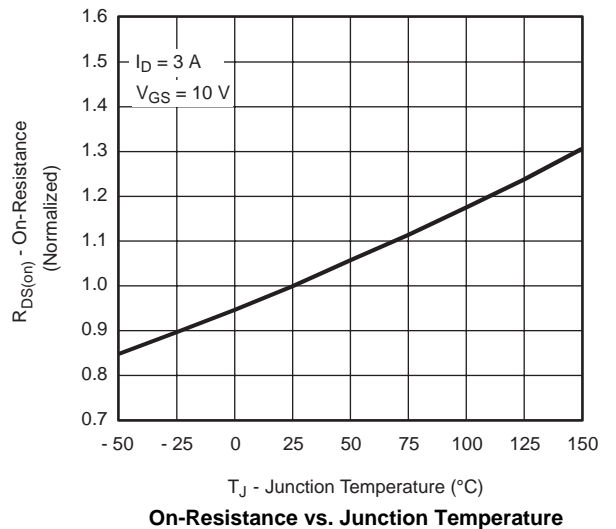
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

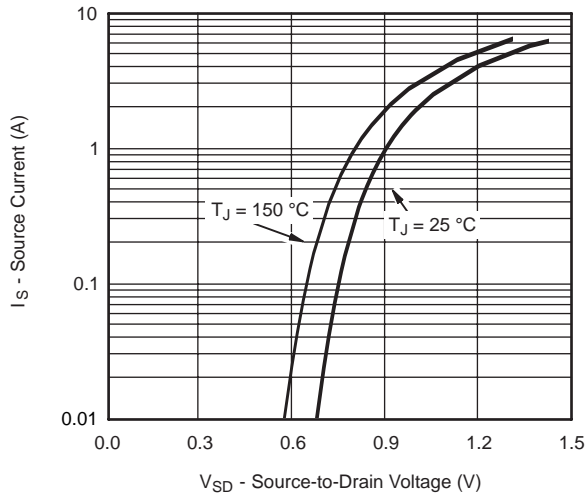


Gate Charge

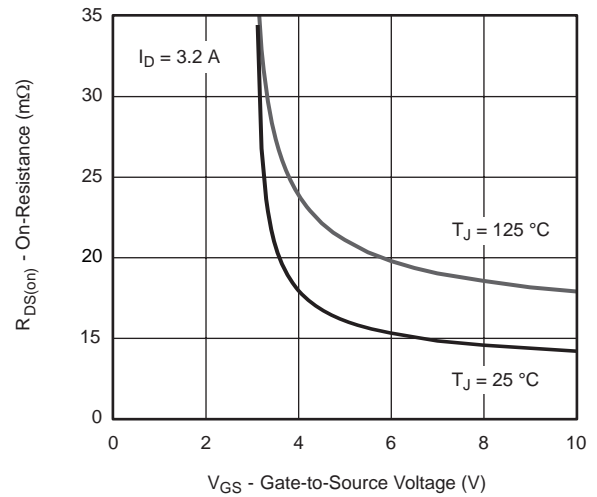


On-Resistance vs. Junction Temperature

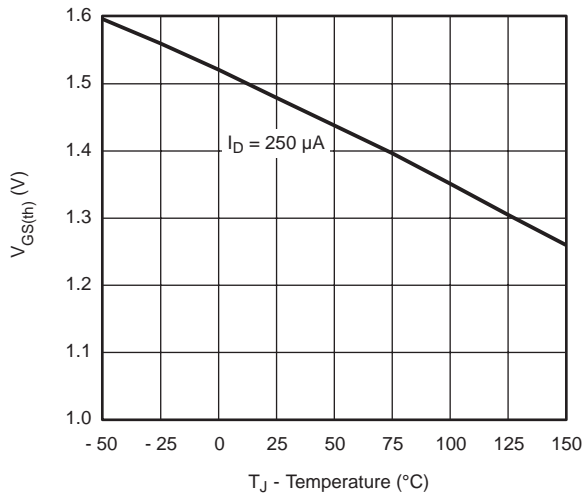
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



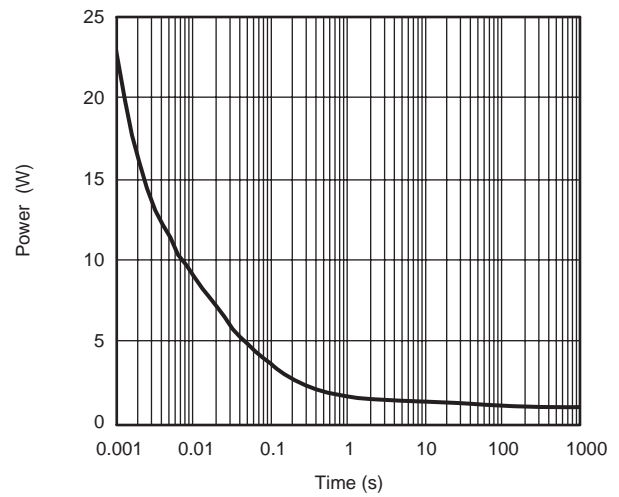
Source-Drain Diode Forward Voltage



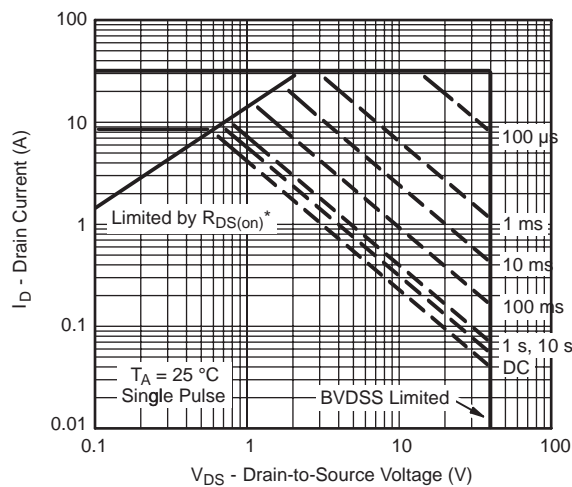
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

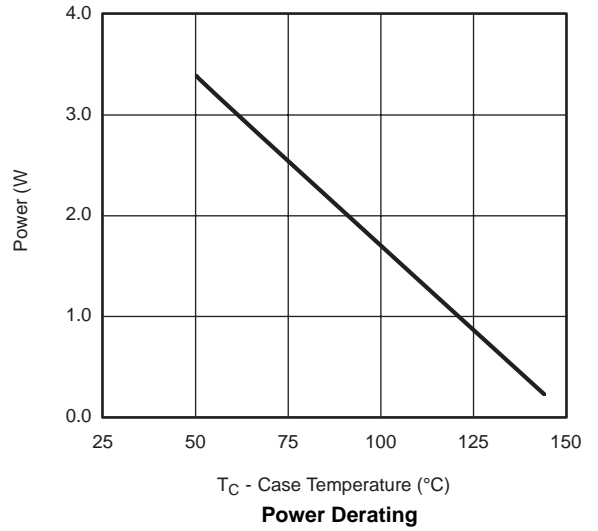
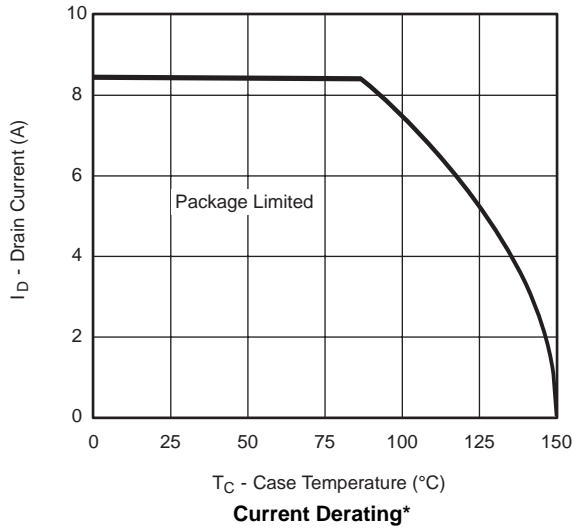


Single Pulse Power



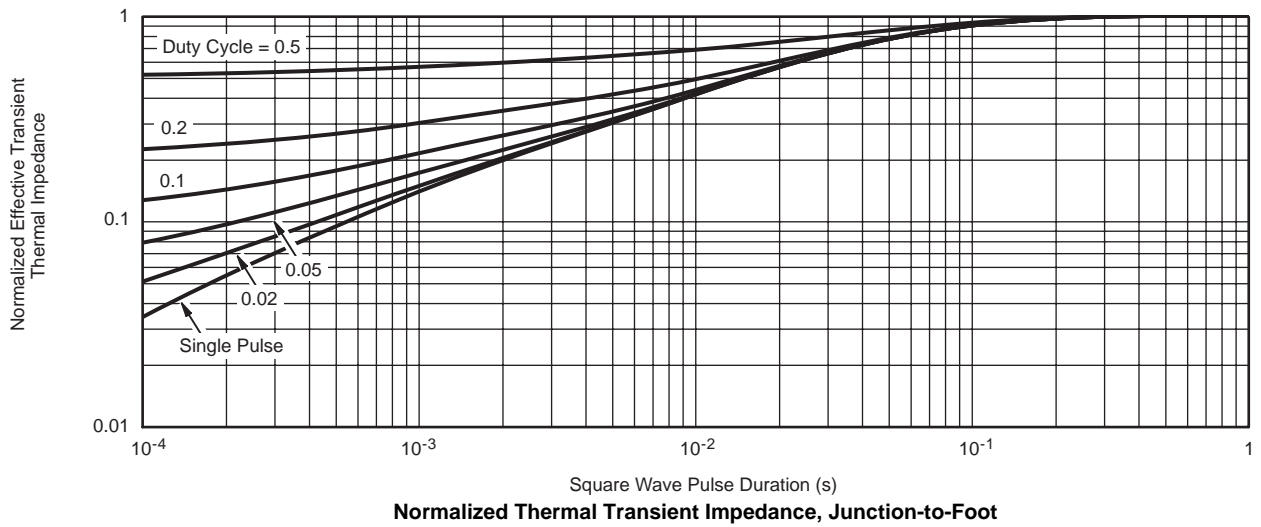
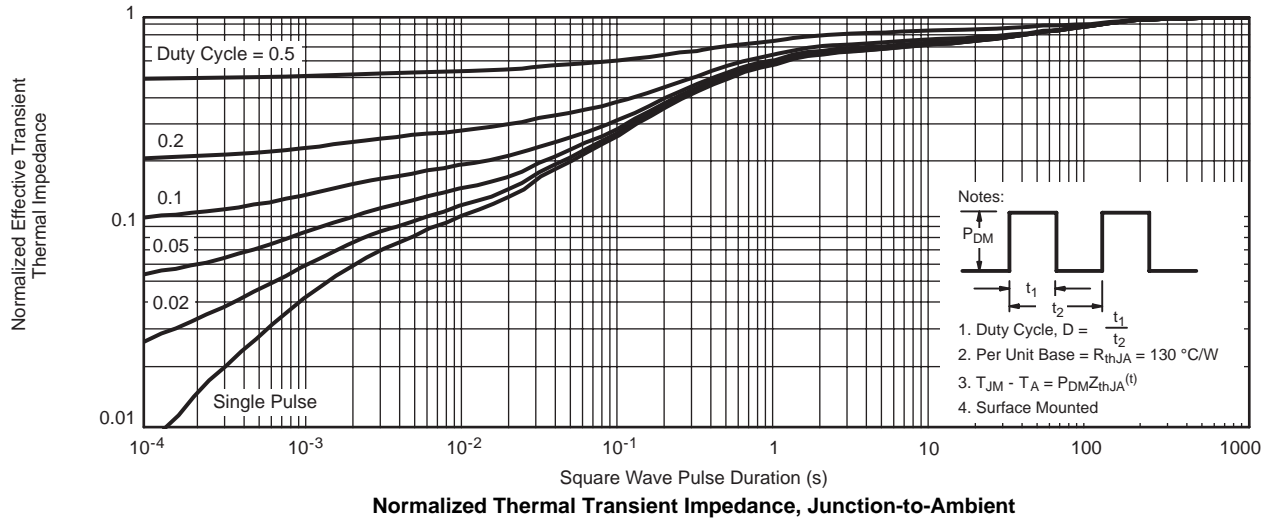
Safe Operating Area, Junction-to-Ambient
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

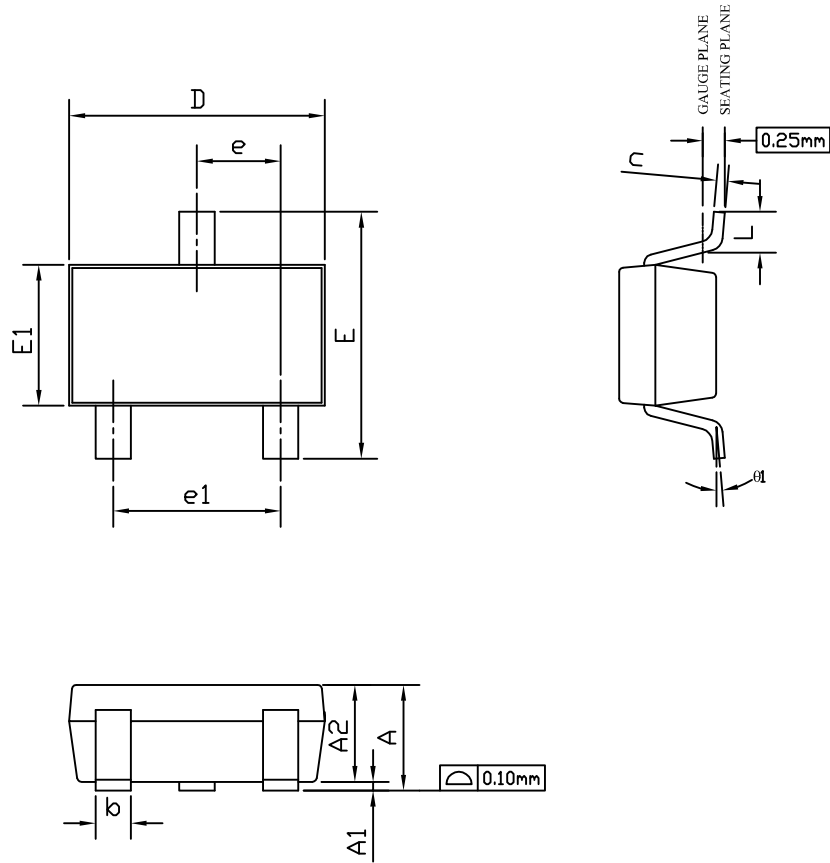


* The power dissipation P_D is based on $T_{J(max)} = 150\text{ °C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

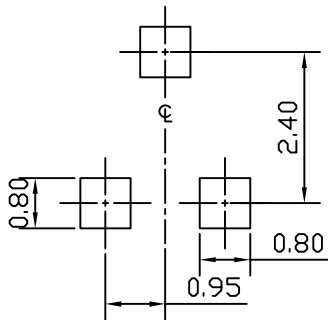
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



SOT-23-3L PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	---	1.25	0.033	---	0.049
A1	0.00	---	0.13	0.000	---	0.005
A2	0.70	1.00	1.15	0.028	0.039	0.045
b	0.30	0.40	0.50	0.012	0.016	0.020
c	0.08	0.13	0.20	0.003	0.005	0.008
D	2.80	2.90	3.10	0.110	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.40	1.60	1.80	0.055	0.063	0.071
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	---	0.60	0.012	---	0.024
θ1	0°	5°	8°	0°	5°	8°

NOTE

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH OR GATE BURRS.
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 5 MILS EACH.
2. TOLERANCE ± 0.100 mm (4 mil) UNLESS OTHERWISE SPECIFIED.
3. DIMENSION L IS MEASURED IN GAUGE PLANE.
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. ALL DIMENSIONS ARE IN MILLIMETERS.

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