

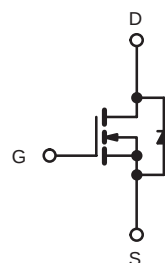
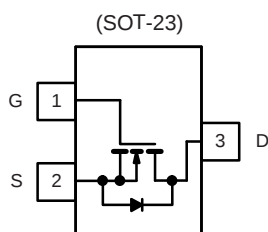
N-Channel 20V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^{a, g}	Q_g (Typ.)
20	0.011 at $V_{GS} = 10$ V	9	8nC
	0.012 at $V_{GS} = 4.5$ V	8	

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Trench Gen III Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC


RoHS
 COMPLIANT


N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$ $9^{\text{a, g}}$	A
		$T_C = 70^\circ\text{C}$ 6.5^{g}	
		$T_A = 25^\circ\text{C}$ $7^{\text{b, c}}$	
		$T_A = 70^\circ\text{C}$ $4.5^{\text{b, c}}$	
Pulsed Drain Current	I_{DM}	32^{g}	
Avalanche Current	I_{AS}	15	
Avalanche Energy	E_{AS}	11.25	mJ
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$ $3^{\text{a, g}}$	A
		$T_A = 25^\circ\text{C}$ $1.5^{\text{b, c}}$	
Maximum Power Dissipation	P_D	$T_C = 25^\circ\text{C}$ 3.5	W
		$T_C = 70^\circ\text{C}$ 2.0	
		$T_A = 25^\circ\text{C}$ $2.3^{\text{b, c}}$	
		$T_A = 70^\circ\text{C}$ $1.0^{\text{b, c}}$	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	$t \leq 10$ s	R_{thJA}	29	36	$^\circ\text{C/W}$
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	3.6	4.5	

Notes:

 a. Based on $T_C = 25^\circ\text{C}$.

b. Surface Mounted on 1" x 1" FR4 board.

 c. $t = 10$ s.

d. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

 f. Maximum under Steady State conditions is 81°C/W .

g. Package limited.

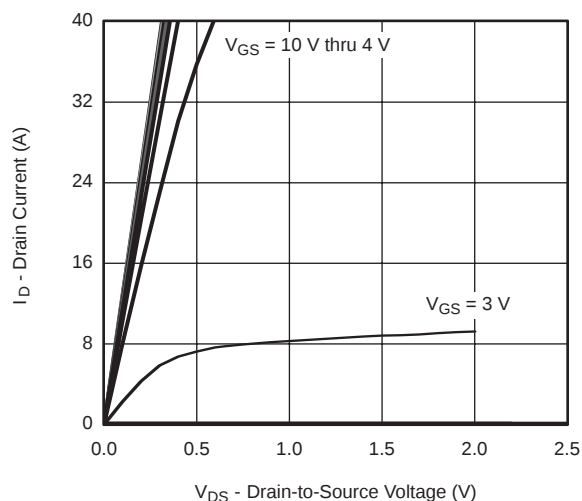
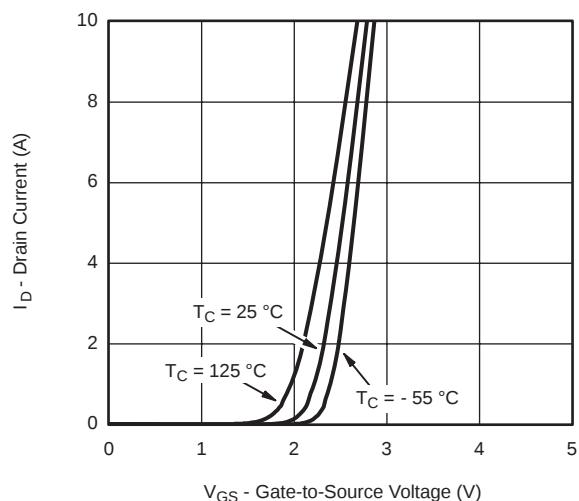
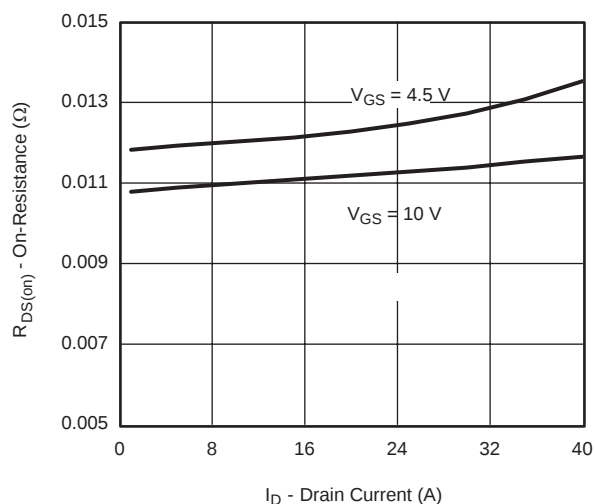
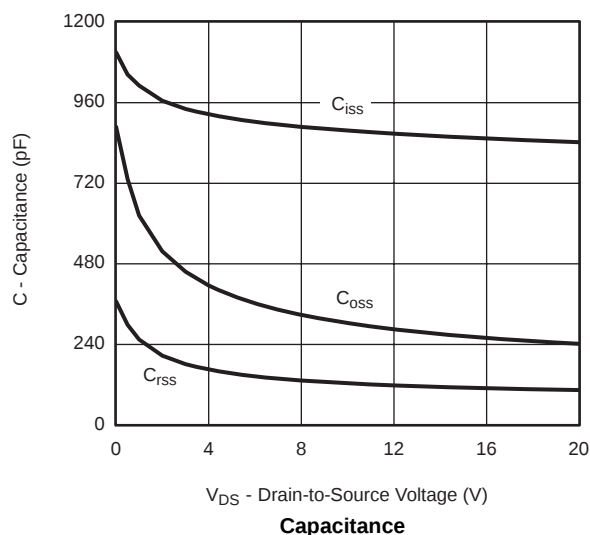
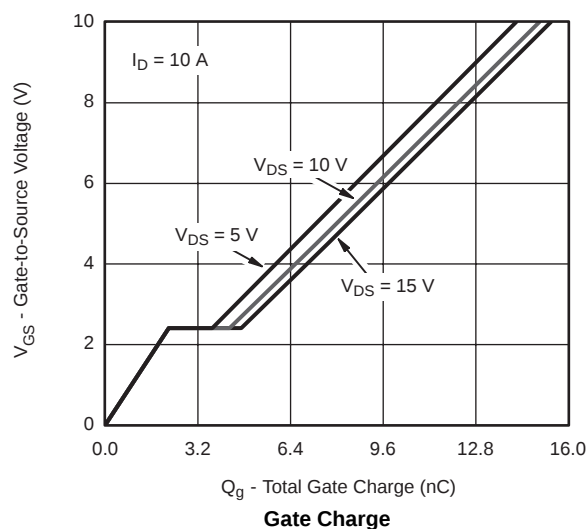
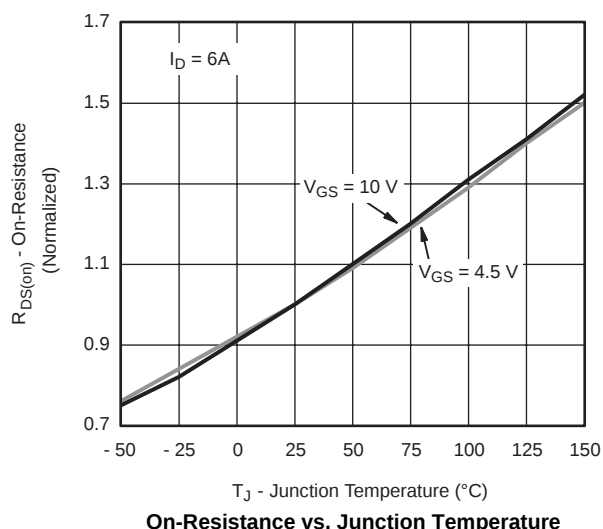
SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		22		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 5.0		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.5		2.0	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C			5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	12			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 10 A		0.011		Ω
		V _{GS} = 4.5 V, I _D = 7 A		0.012		
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 10 A		26		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		850		pF
Output Capacitance	C _{oss}			305		
Reverse Transfer Capacitance	C _{rss}			120		
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 10 V, I _D = 10 A		15	23	nC
Gate-Source Charge	Q _{gs}	V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 10 A		7.0	10	
Gate-Drain Charge	Q _{gd}			2.2		
Gate Resistance	R _g			2.1		
Gate Resistance	R _g	f = 1 MHz	0.2	0.9	1.8	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 2 Ω I _D ≅ 5 A, V _{GEN} = 4.5 V, R _g = 1 Ω		15	30	ns
Rise Time	t _r			11	22	
Turn-Off Delay Time	t _{d(off)}			16	30	
Fall Time	t _f			8	16	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 2 Ω I _D ≅ 5 A, V _{GEN} = 10 V, R _g = 1 Ω		10	20	
Rise Time	t _r			8	16	
Turn-Off Delay Time	t _{d(off)}			16	30	
Fall Time	t _f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			12	A
Pulse Diode Forward Current	I _{SM}				36	
Body Diode Voltage	V _{SD}	I _S = 3 A, V _{GS} = 0 V		0.77	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C		14	28	ns
Body Diode Reverse Recovery Charge	Q _{rr}			4.5	9	nC
Reverse Recovery Fall Time	t _a			5.5		ns
Reverse Recovery Rise Time	t _b			8.5		

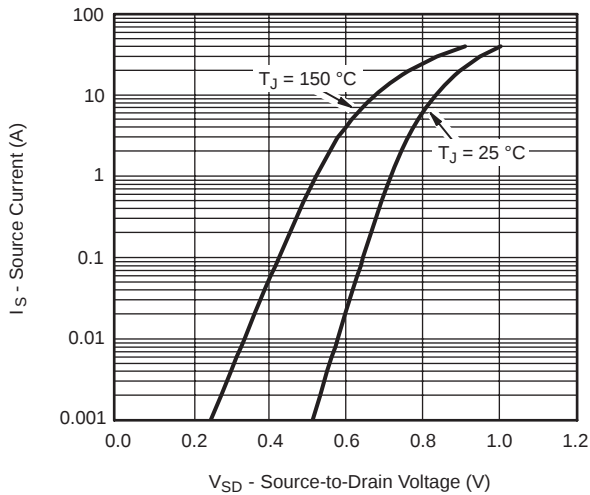
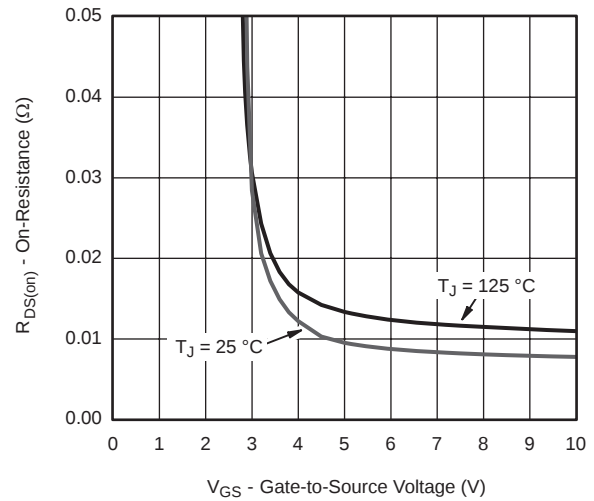
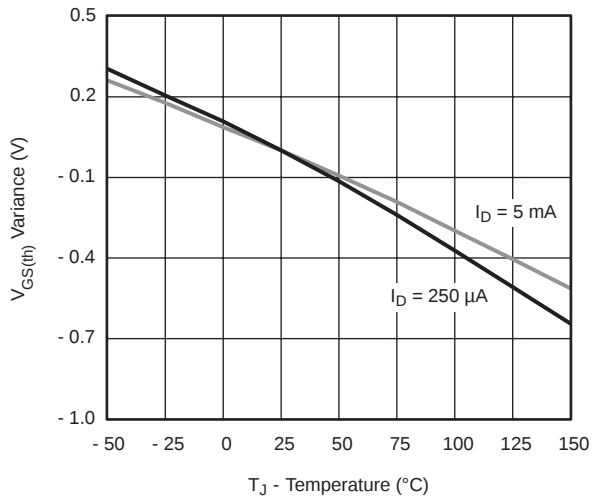
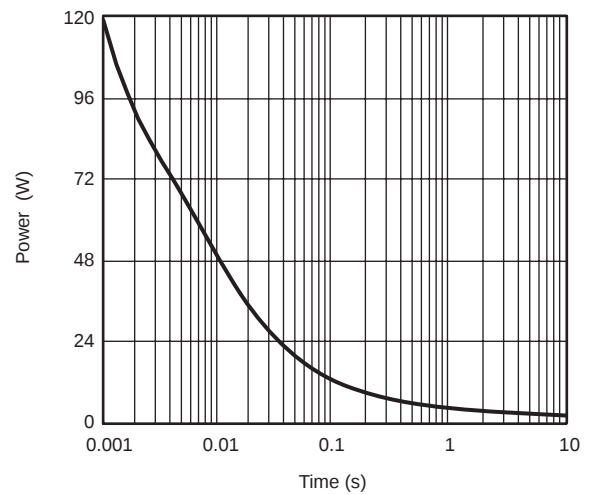
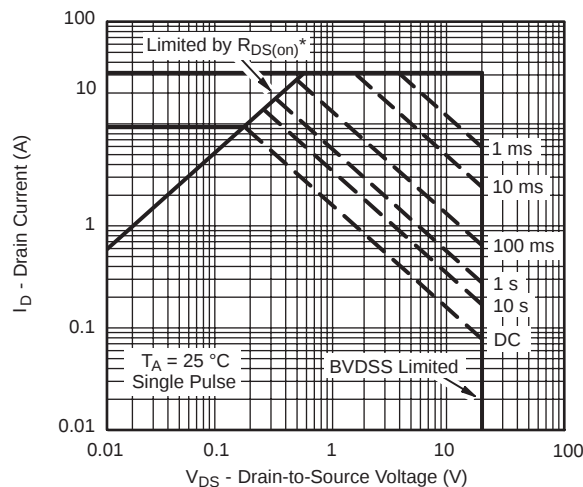
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

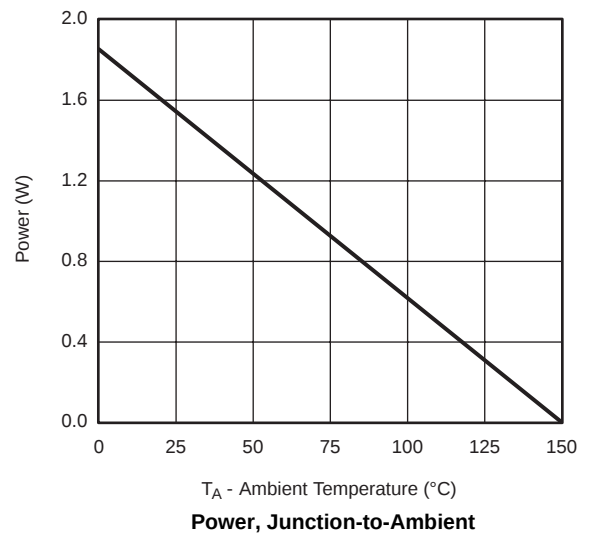
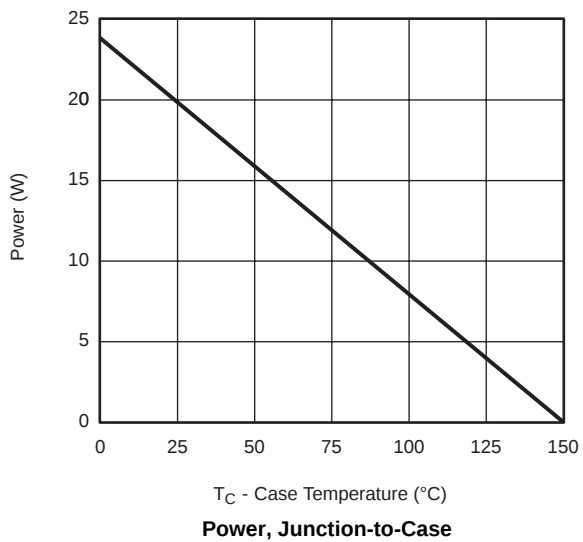
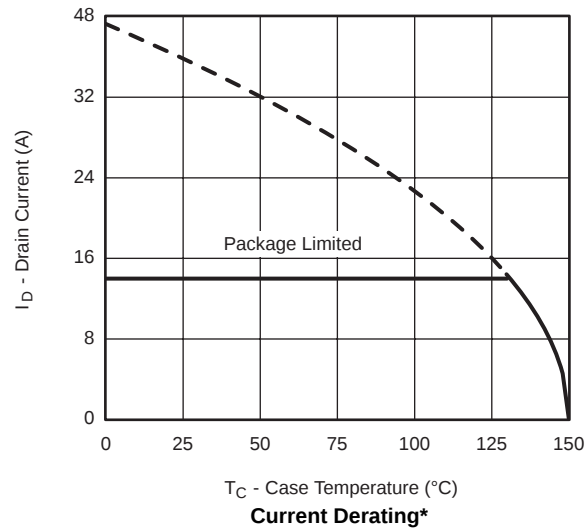
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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 (Junction-to-Ambient)


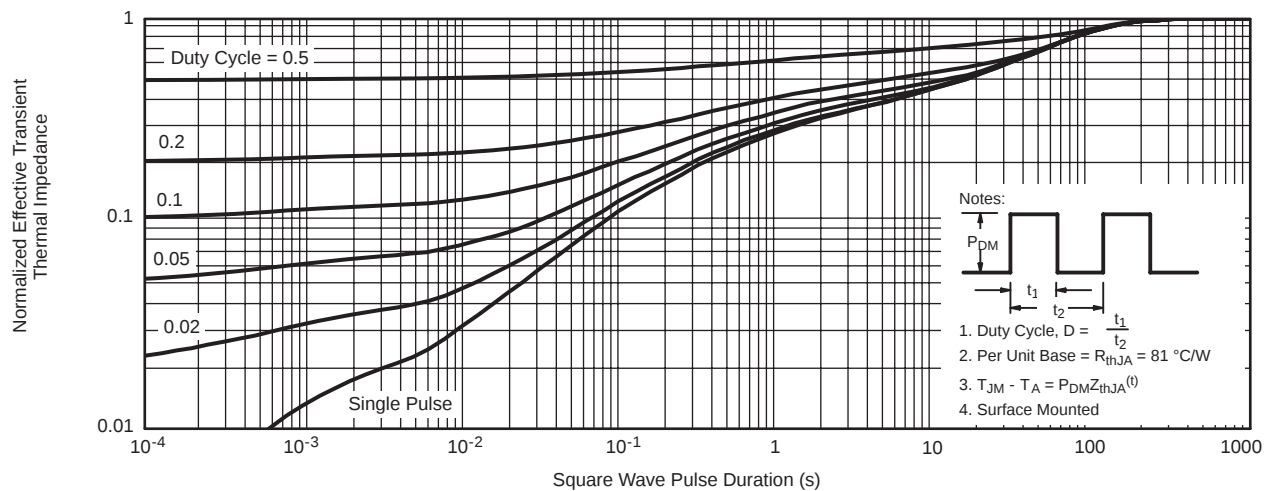
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

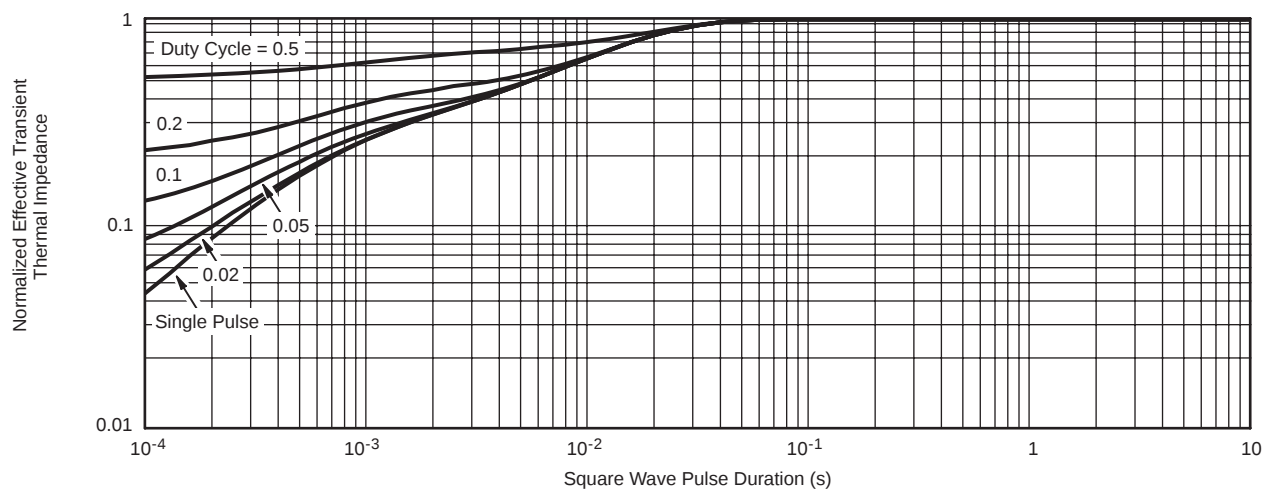
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


* The power dissipation P_D is based on $T_{J(max)} = 150$ °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.

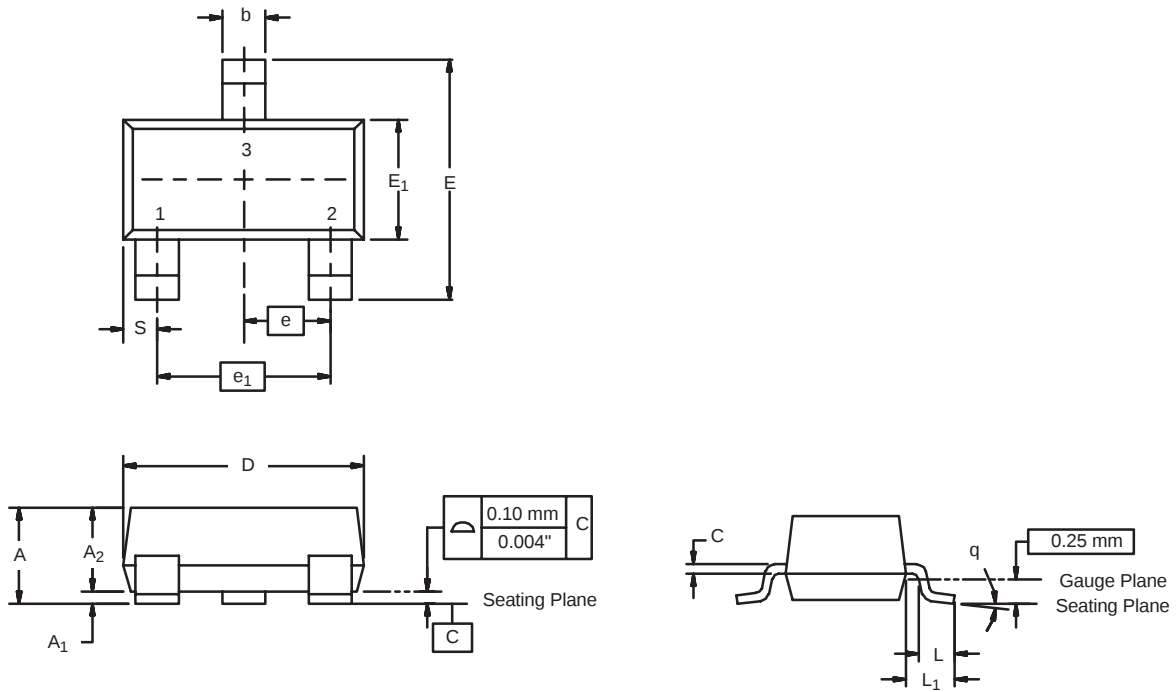
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient

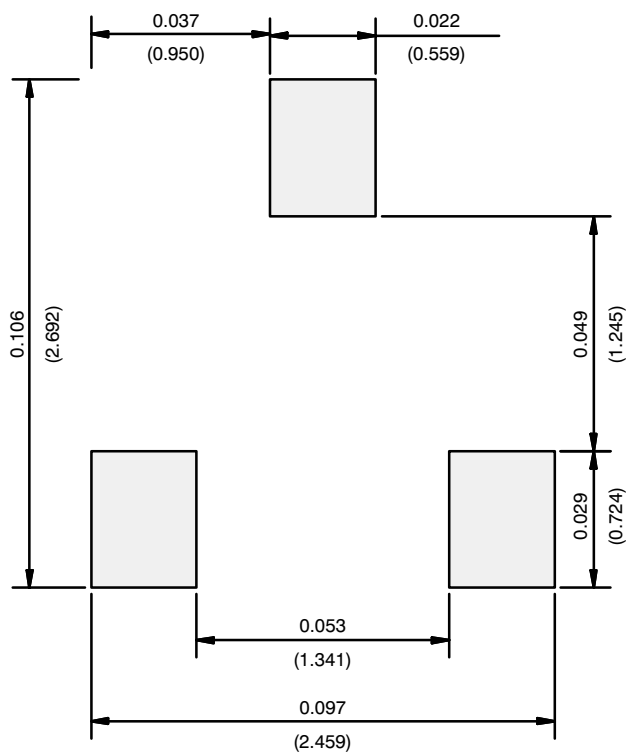


Normalized Thermal Transient Impedance, Junction-to-Case

SOT-23 : 3-LEAD

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A ₁	0.01	0.10	0.0004	0.004
A ₂	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E ₁	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e ₁	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L ₁	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°
ECN: S-03946-Rev. K, 09-Jul-01 DWG: 5479				

RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

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