

N-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
20	0.027 at $V_{GS} = 4.5$ V	8	9 nC
	0.032 at $V_{GS} = 2.5$ V	8	
	0.040 at $V_{GS} = 1.8$ V	8	

FEATURES

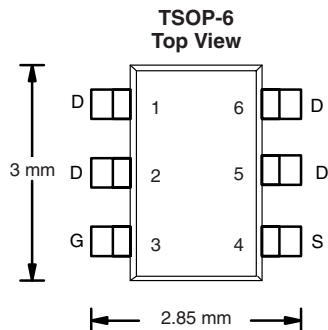
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



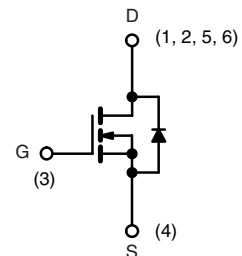
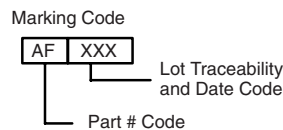
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Load Switch for Portable Applications
- Load Switch for Low Voltage Bus



Ordering Information: Si3460BDV-T1-E3 (Lead (Pb)-free)
Si3460BDV-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 8	
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	8 ^a
		$T_C = 70$ °C	7.1
		$T_A = 25$ °C	6.7 ^{b, c}
		$T_A = 70$ °C	5.4 ^{b, c}
Pulsed Drain Current	I_{DM}	20	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	
		$T_A = 25$ °C	1.7 ^{b, c}
Maximum Power Dissipation	P_D	$T_C = 25$ °C	3.5
		$T_C = 70$ °C	2.2
		$T_A = 25$ °C	2 ^{b, c}
		$T_A = 70$ °C	1.3 ^{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}	$t \leq 5$ s	R_{thJA}	50	62.5	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	30	36	

Notes:

- Package limited
- Surface Mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- Maximum under steady state conditions is 110 °C/W.

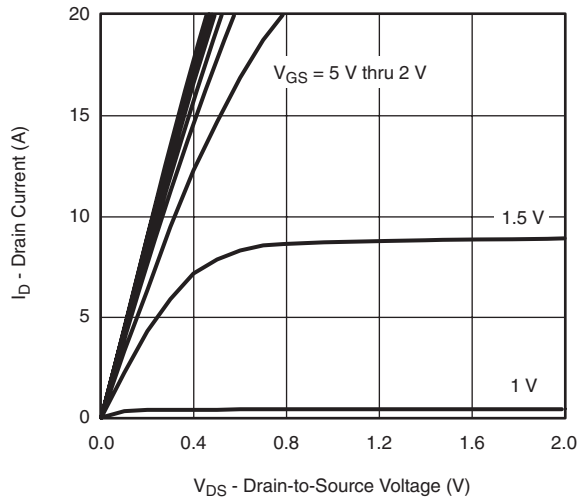
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		22.5		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 2.9		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.45		1.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	ns
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}, V_{GS} = 4.5\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 5.1\text{ A}$		0.023	0.027	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 4.7\text{ A}$		0.027	0.032	
		$V_{GS} = 1.8\text{ V}, I_D = 2.5\text{ A}$		0.033	0.040	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 5.1\text{ A}$		22		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		860		μF
Output Capacitance	C_{oss}			110		
Reverse Transfer Capacitance	C_{rss}			65		
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 8\text{ V}, I_D = 8\text{ A}$		16	24	nC
		$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 8\text{ A}$		9	13.5	
Gate-Source Charge	Q_{gs}			1.4		
Gate-Drain Charge	Q_{gd}		1.4			
Gate Resistance	R_g	$f = 1\text{ MHz}$		3.2		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 1.9\text{ }\Omega$ $I_D \cong 5.4\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		7	15	ns
Rise Time	t_r			60	90	
Turn-Off Delay Time	$t_{d(off)}$			25	40	
Fall Time	t_f			6	10	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 1.9\text{ }\Omega$ $I_D \cong 5.4\text{ A}, V_{GEN} = 8\text{ V}, R_g = 1\text{ }\Omega$		5	10	
Rise Time	t_r			15	25	
Turn-Off Delay Time	$t_{d(off)}$			25	40	
Fall Time	t_f			5	10	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			8	A
Pulse Diode Forward Current	I_{SM}				20	
Body Diode Voltage	V_{SD}	$I_S = 5.4\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 5.4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		20	40	ns
Body Diode Reverse Recovery Charge	Q_{rr}			9	20	nC
Reverse Recovery Fall Time	t_a			12		ns
Reverse Recovery Rise Time	t_b			8		

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.

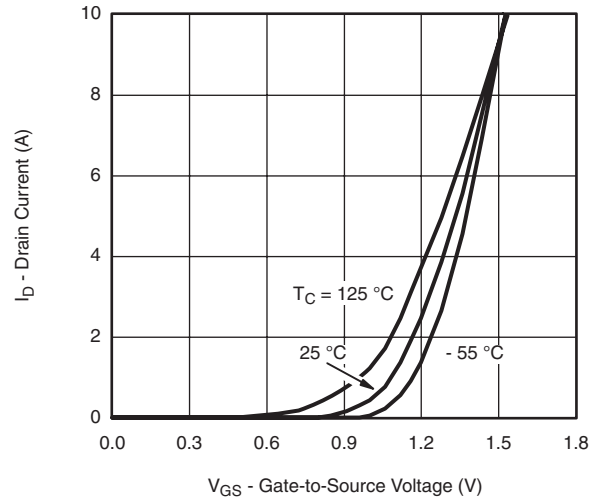
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



$V_{GS} = 5 \text{ V thru } 2 \text{ V}$

Output Characteristics

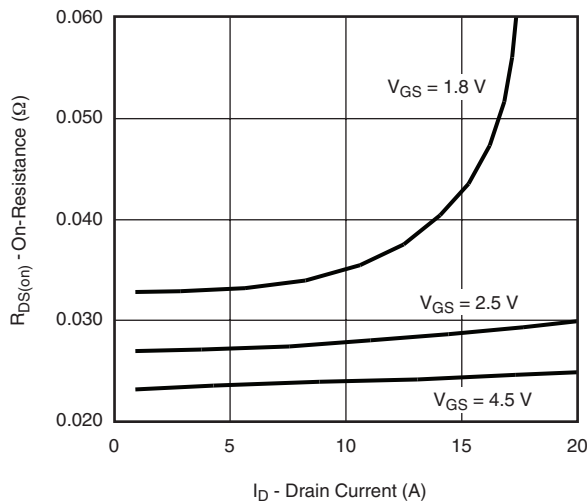


$T_C = 125 \text{ }^\circ\text{C}$

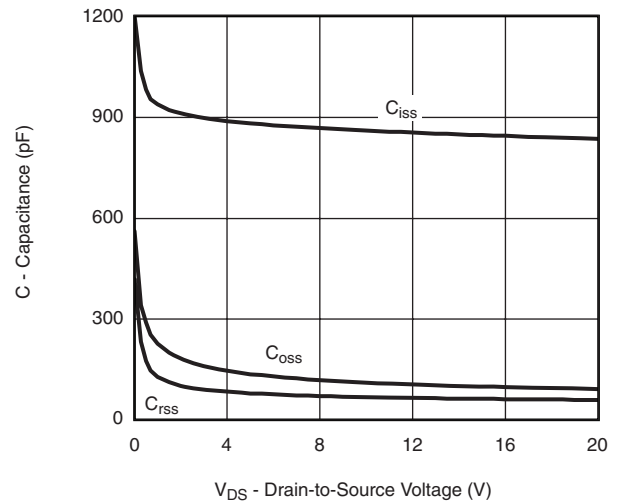
$25 \text{ }^\circ\text{C}$

$-55 \text{ }^\circ\text{C}$

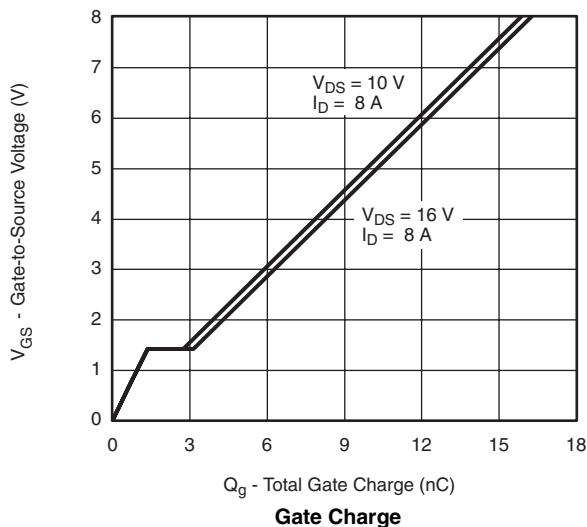
Transfer Characteristics



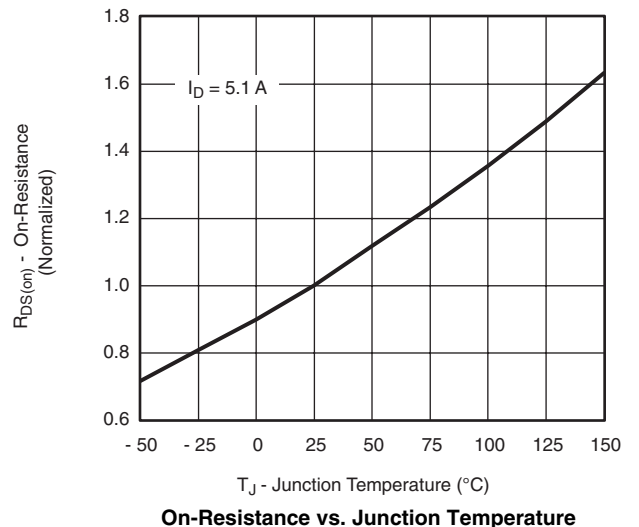
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

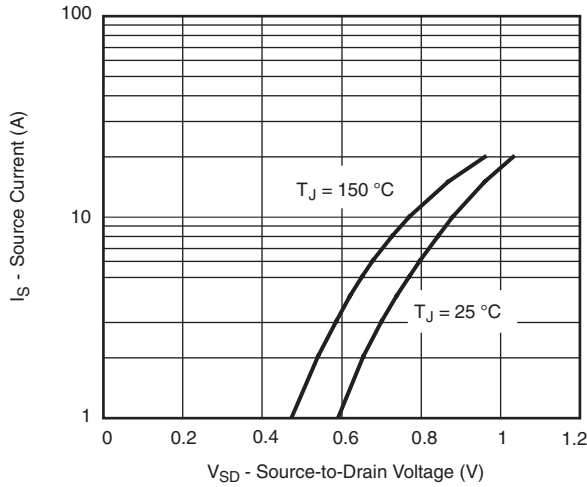


Gate Charge

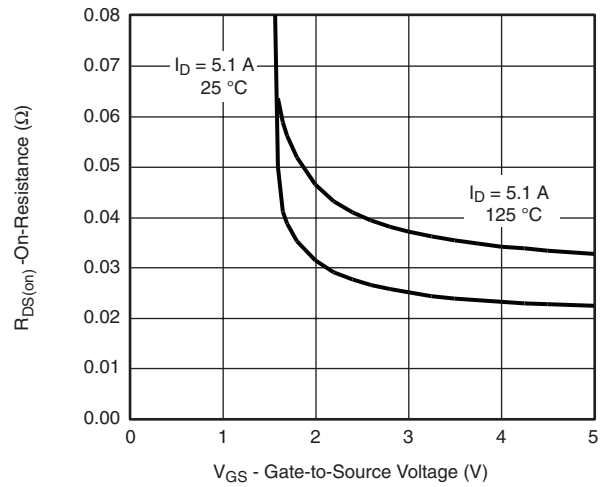


On-Resistance vs. Junction Temperature

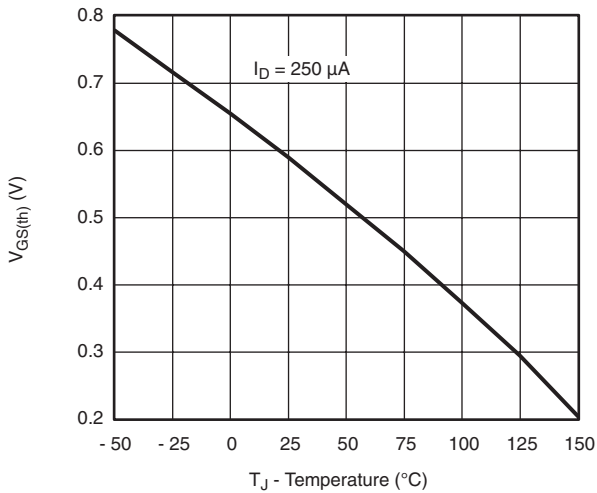
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



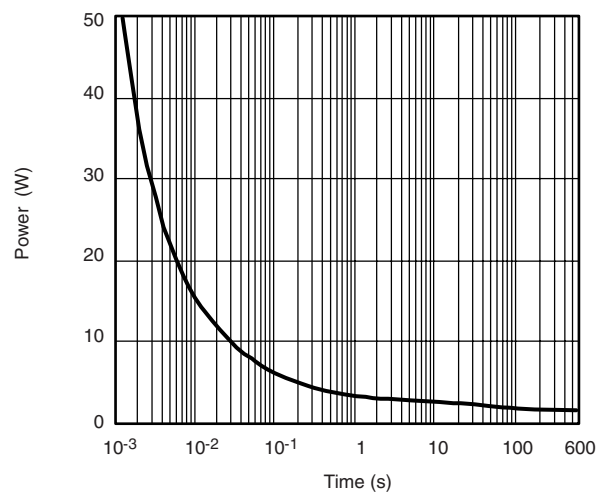
Source-Drain Diode Forward Voltage



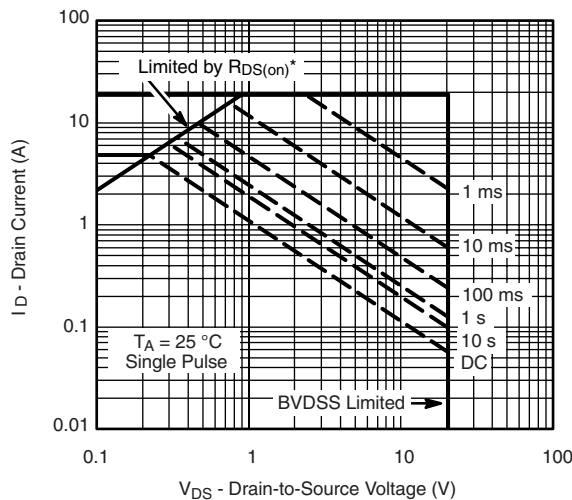
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



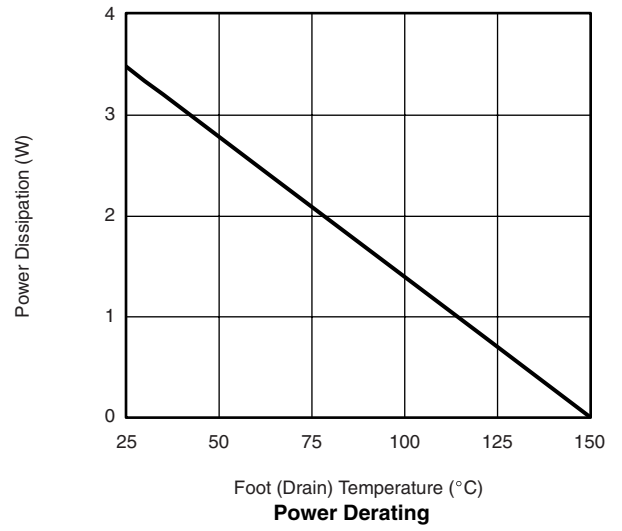
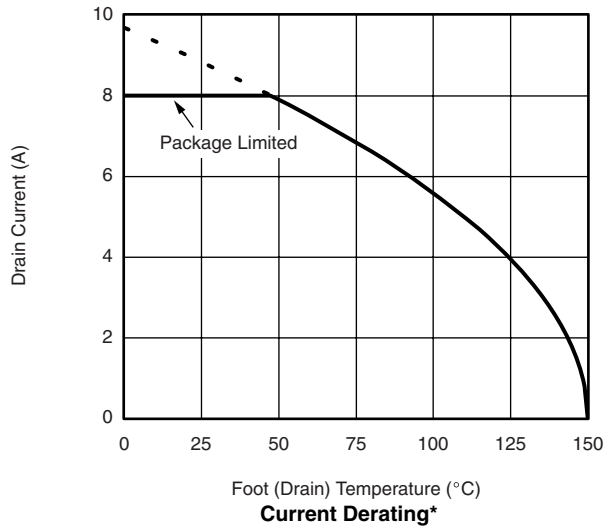
Single Pulse Power (Junction-to-Ambient)



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

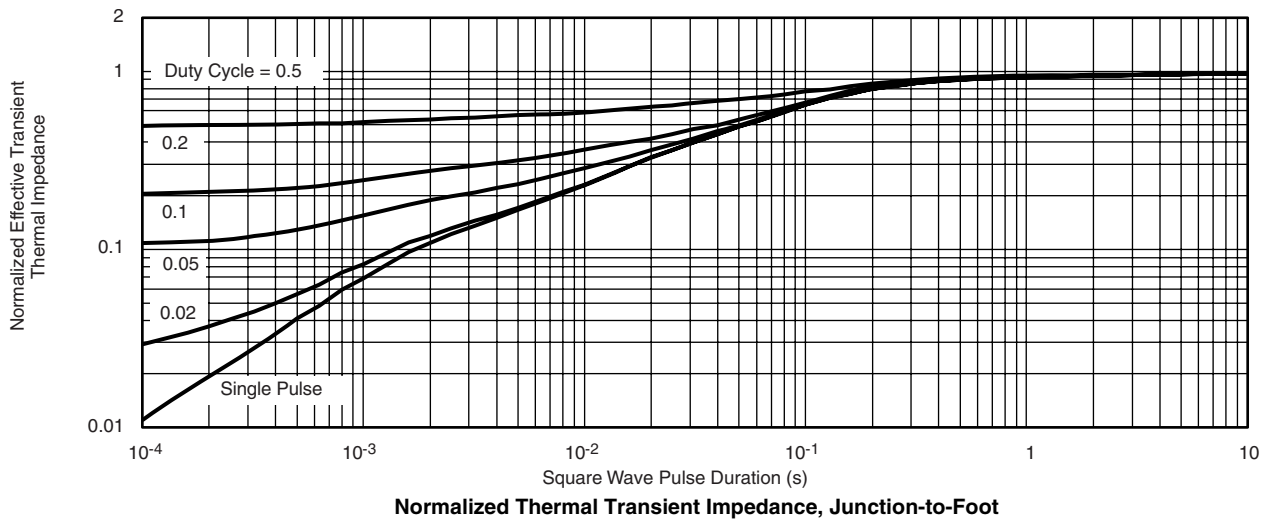
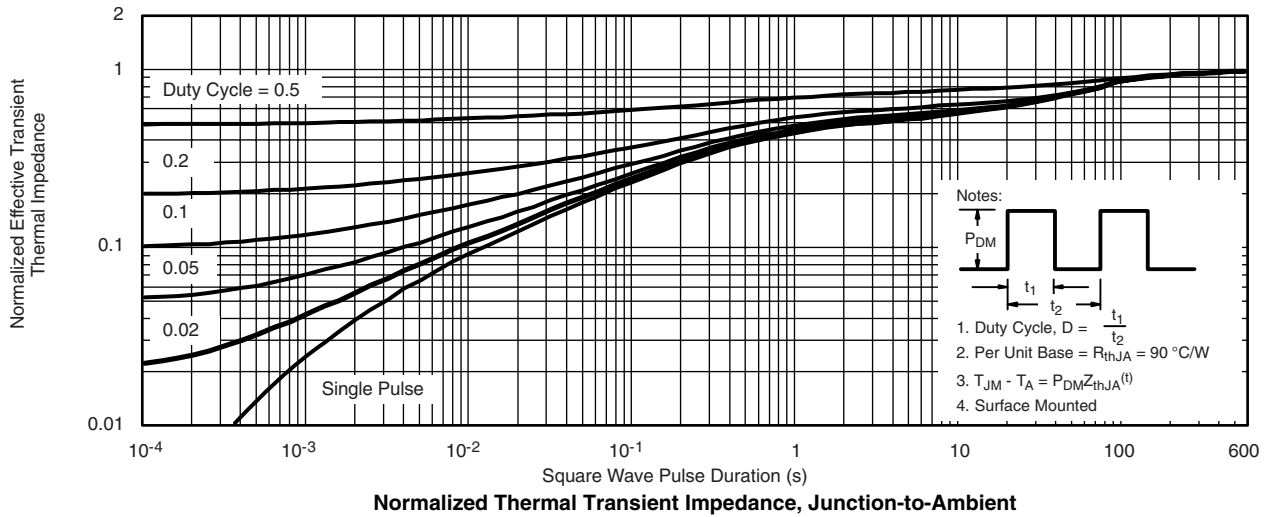
Safe Operating Area, Junction-to-Ambient

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



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TSOP: 5/6-LEAD

JEDEC Part Number: MO-193C



5-LEAD TSOP



6-LEAD TSOP



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	-	1.10	0.036	-	0.043
A ₁	0.01	-	0.10	0.0004	-	0.004
A ₂	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E ₁	1.55	1.65	1.70	0.061	0.065	0.067
e	0.95 BSC			0.0374 BSC		
e ₁	1.80	1.90	2.00	0.071	0.075	0.079
L	0.32	-	0.50	0.012	-	0.020
L ₁	0.60 Ref			0.024 Ref		
L ₂	0.25 BSC			0.010 BSC		
R	0.10	-	-	0.004	-	-
θ	0°	4°	8°	0°	4°	8°
θ ₁	7° Nom			7° Nom		
ECN: C-06593-Rev. I, 18-Dec-06						
DWG: 5540						



Recommended Land Pattern For TSOP-5L / TSOP-6L



Note

- All dimensions are in inches (millimeter)

ECN: C22-0860-Rev. B, 24-Oct-2022
 DWG: 3010



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