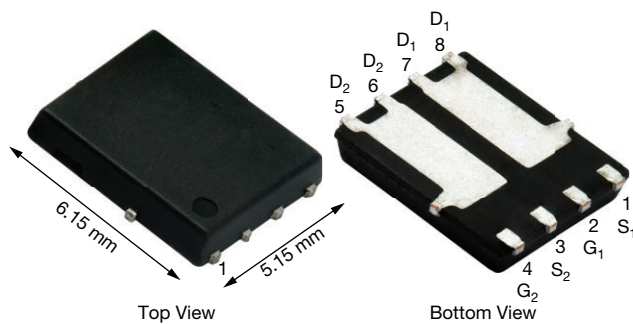


MI5813-VB Datasheet

Dual P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^{e,f}	Q_g (Typ.)
- 30	0.019 at $V_{GS} = -10$ V	- 30	24.6 nC
	0.021 at $V_{GS} = -4.5$ V	- 28	



FEATURES

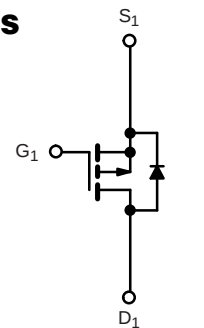
- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFET
- Low Thermal Resistance Power Package with Small Size and Low 1.07 mm Profile
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



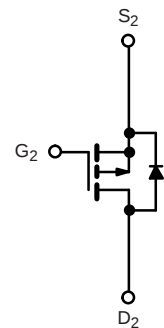
RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch
- Adaptor Switch
- Notebook PC



P-Channel MOSFET



P-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 30	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	- 30 ^e
		$T_C = 70^\circ\text{C}$	- 28 ^e
		$T_A = 25^\circ\text{C}$	- 16.1 ^{a, b}
		$T_A = 70^\circ\text{C}$	- 12.9 ^{a, b}
Pulsed Drain Current	I_{DM}	- 60	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$	- 15
		$T_A = 25^\circ\text{C}$	- 3.5 ^{a, b}
Avalanche Current	I_{AS}	- 25	mJ
Single-Pulse Avalanche Energy	E_{AS}	31.25	
Maximum Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	35.7
		$T_C = 70^\circ\text{C}$	22.8
		$T_A = 25^\circ\text{C}$	4.2 ^{a, b}
		$T_A = 70^\circ\text{C}$	2.7 ^{a, b}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 50 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^{c, d}		260	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. $t = 10$ s.

c. The DFN 5x6 package is a leadless package. 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

d. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

e. Package limited.

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

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, b}	$t \leq 10$ s	R_{thJA}	25	30	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	2.9	3.5	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. Maximum under steady state conditions is 70 °C/W.

SPECIFICATIONS $T_J = 25$ °C, unless otherwise noted

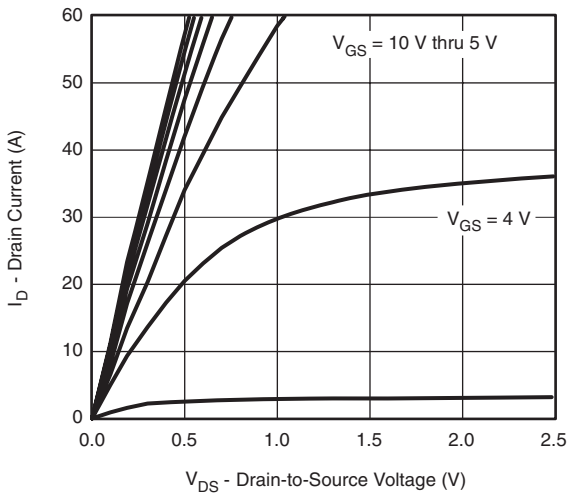
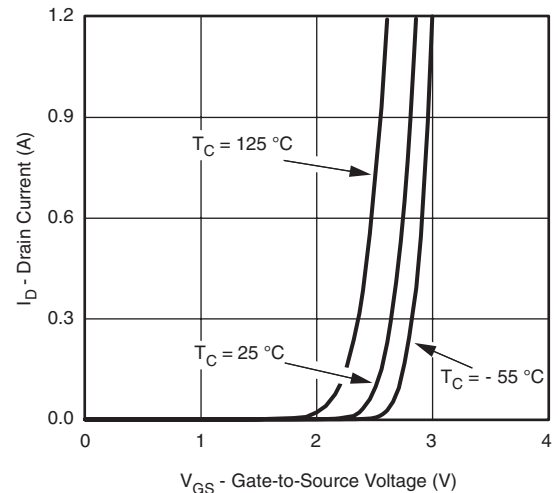
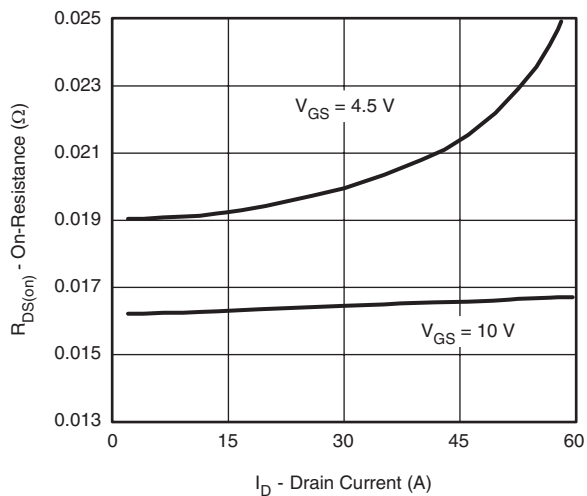
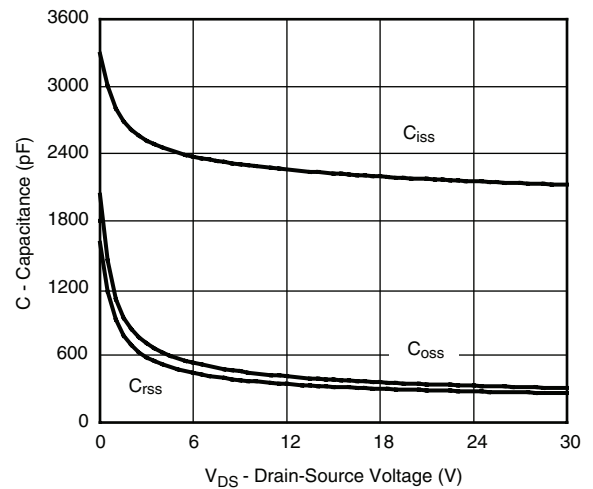
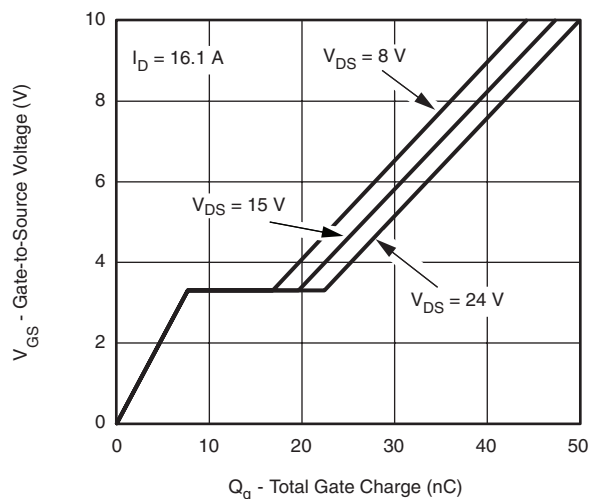
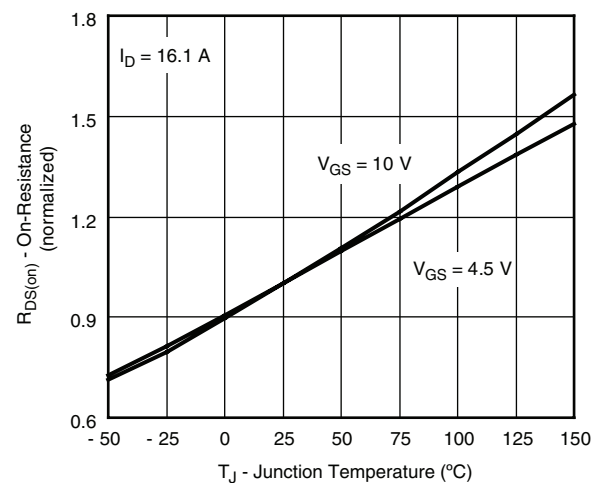
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 20		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			5		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.2		- 2.8	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} = - 30 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 30 V, V _{GS} = 0 V, T _J = 55 °C			- 10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 5 V, V _{GS} = - 10 V	- 3 0			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 10 A		0.0190		Ω
		V _{GS} = - 4.5 V, I _D = 10 A		0.0210		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 12 A		37		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 15 V, V _{GS} = 0 V, f = 1 MHz		2000		pF
Output Capacitance	C _{oss}			385		
Reverse Transfer Capacitance	C _{rss}			322		
Total Gate Charge	Q _g	V _{DS} = - 15 V, V _{GS} = - 10 V, I _D = - 14.4 A		47.5	71	nC
				24.6	37	
Gate-Source Charge	Q _{gs}	V _{DS} = - 15 V, V _{GS} = - 4.5 V, I _D = - 14.4 A		7.7		
Gate-Drain Charge	Q _{gd}			12		
Gate Resistance	R _g	f = 1 MHz	0.3	1.5	3.0	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 15 V, R _L = 1.5 Ω I _D ≡ - 10 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		50	75	ns
Rise Time	t _r			43	65	
Turn-Off DelayTime	t _{d(off)}			30	45	
Fall Time	t _f			14	21	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 15 V, R _L = 1.5 Ω I _D ≡ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω		14	21	
Rise Time	t _r			9	18	
Turn-Off DelayTime	t _{d(off)}			36	54	
Fall Time	t _f			10	20	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 1 0	A
Pulse Diode Forward Current ^a	I _{SM}				- 3 0	
Body Diode Voltage	V _{SD}	I _F = - 10 A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 10 A, dI/dt = 100 A/μs, T _J = 25 °C		31	47	ns
Body Diode Reverse Recovery Charge	Q _{rr}			30	45	nC
Reverse Recovery Fall Time	t _a			15		ns
Reverse Recovery Rise Time	t _b			16		

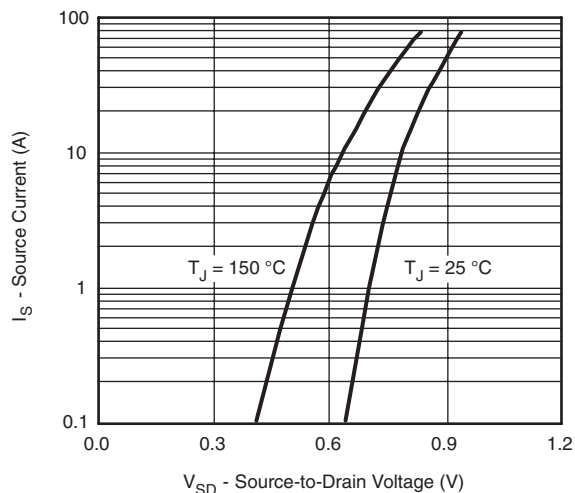
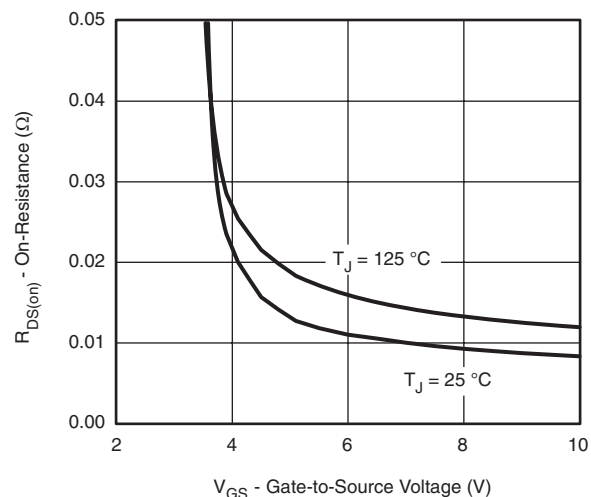
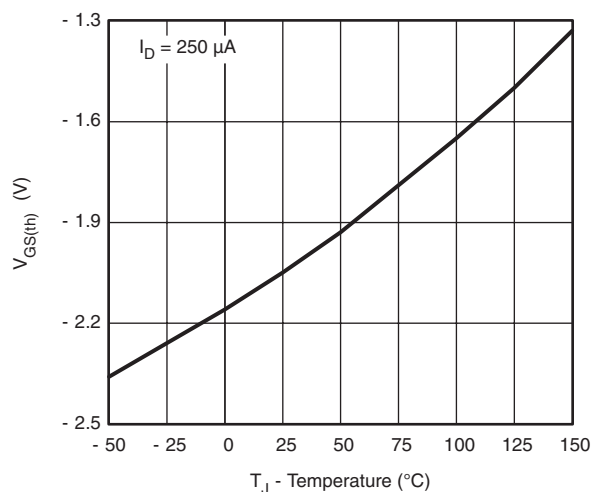
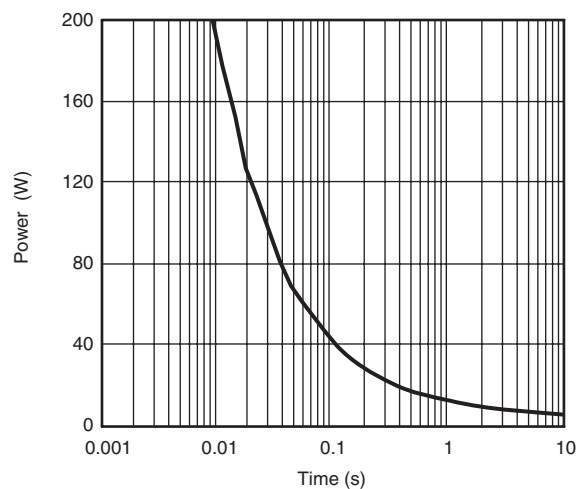
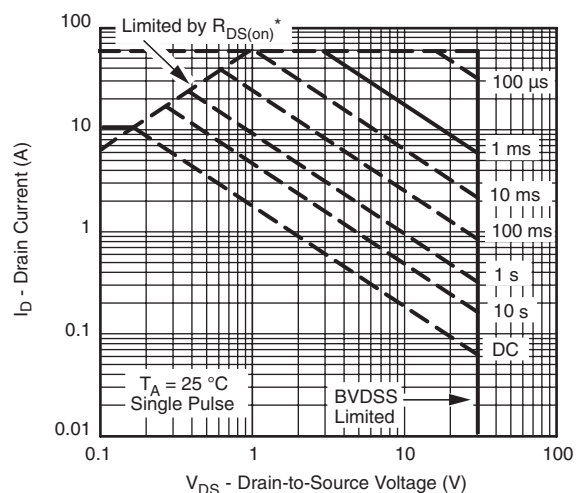
Notes:

a. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.

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

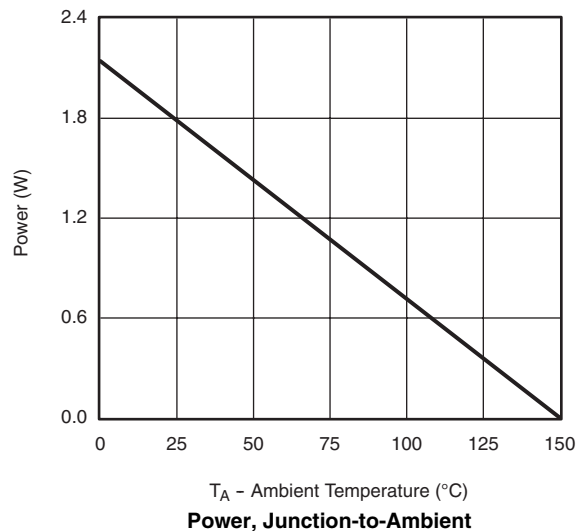
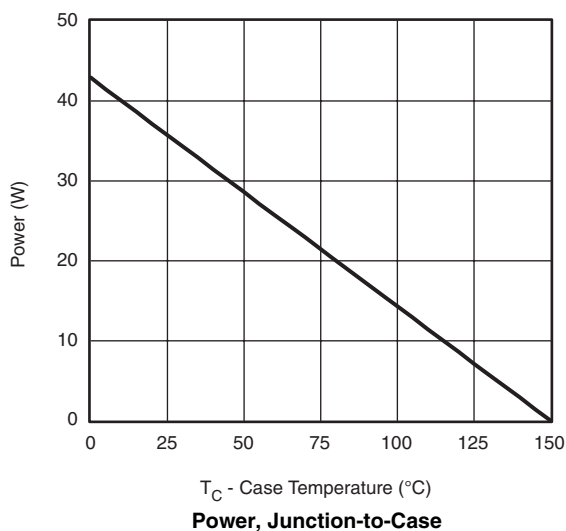
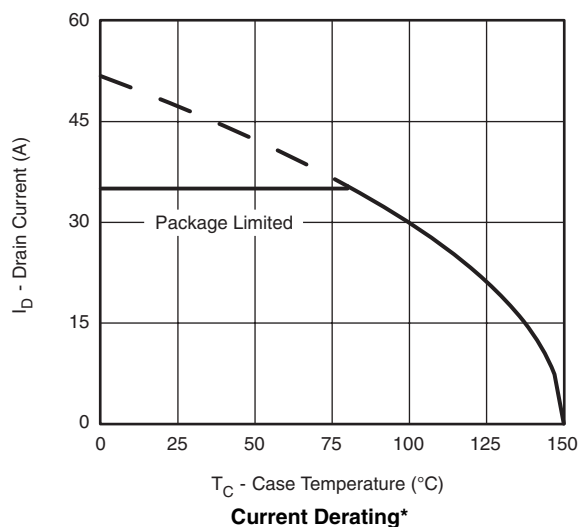
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

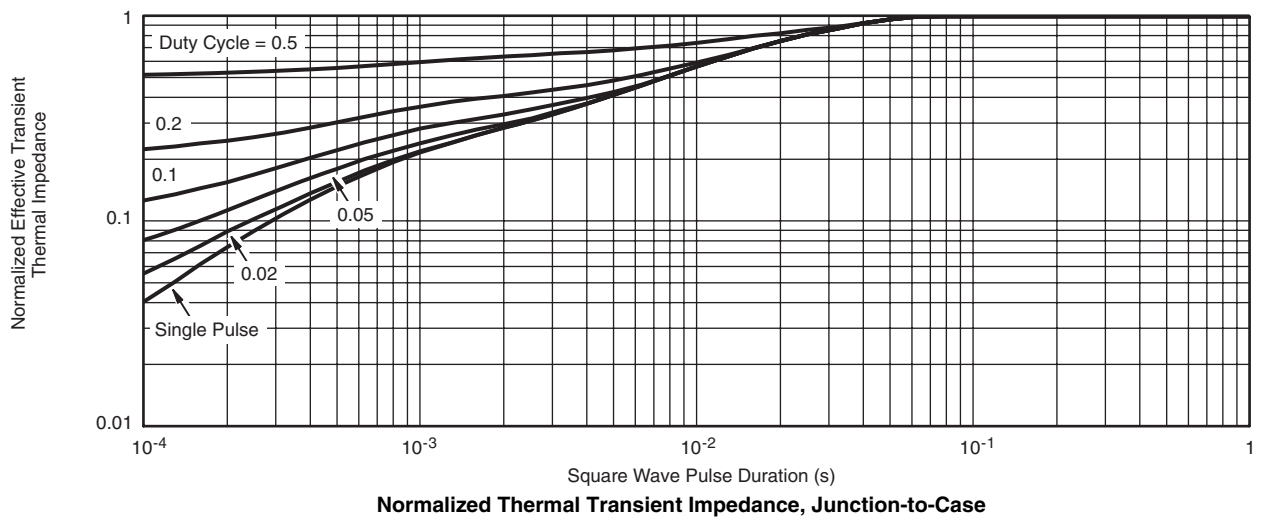
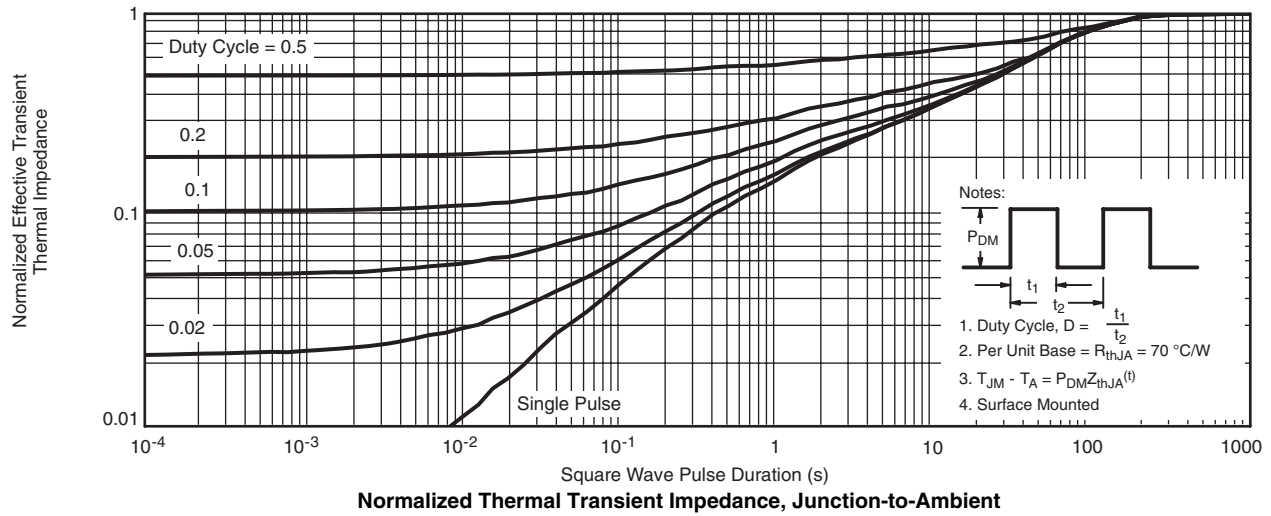
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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

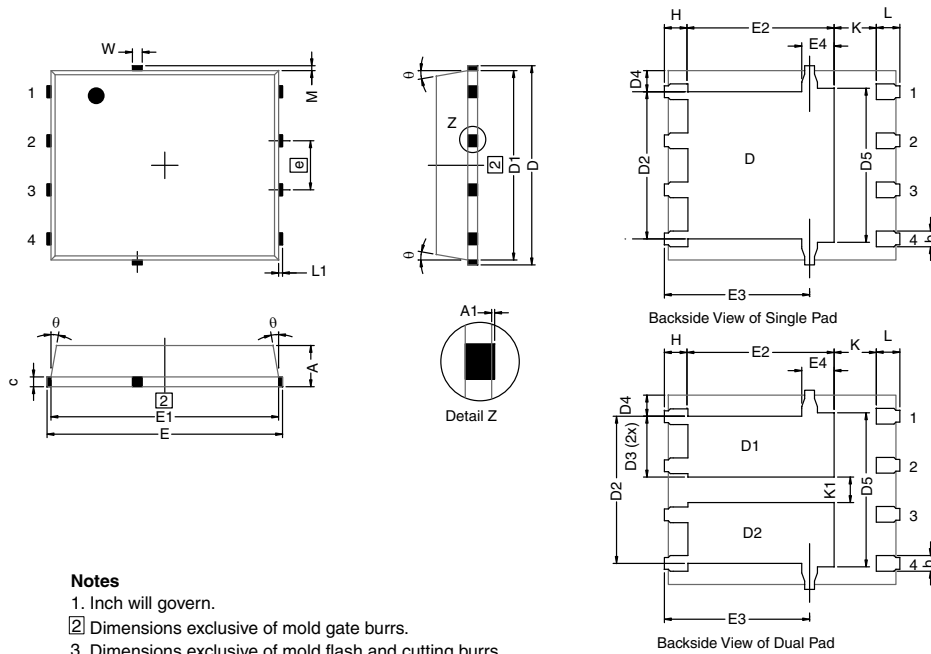
Safe Operating Area, Junction-to-Ambient

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


PowerPAK® SO-8, (Single/Dual)

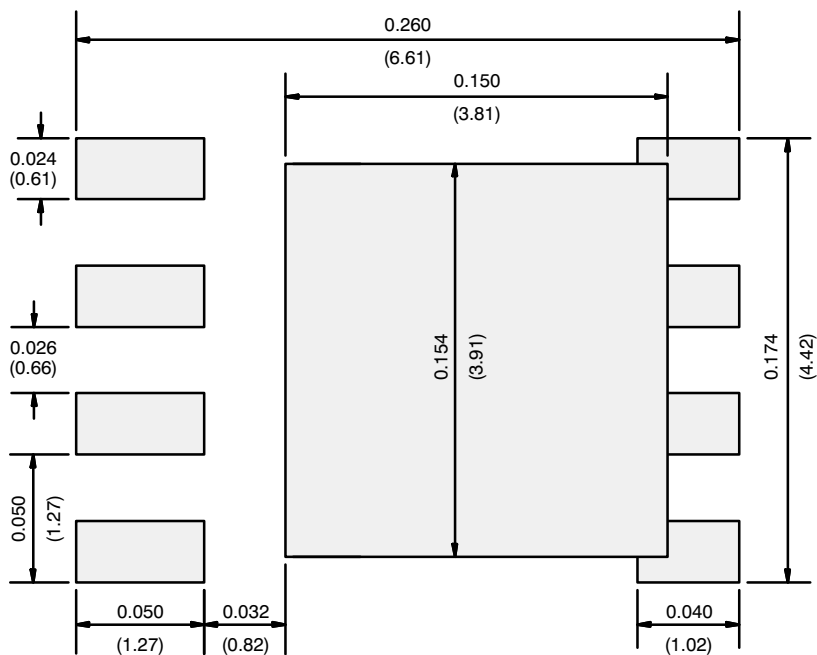


Notes

1. Inch will govern.
- ② Dimensions exclusive of mold gate burrs.
3. Dimensions exclusive of mold flash and cutting burrs.

DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.97	1.04	1.12	0.038	0.041	0.044
A1		-	0.05	0	-	0.002
b	0.33	0.41	0.51	0.013	0.016	0.020
c	0.23	0.28	0.33	0.009	0.011	0.013
D	5.05	5.15	5.26	0.199	0.203	0.207
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	3.56	3.76	3.91	0.140	0.148	0.154
D3	1.32	1.50	1.68	0.052	0.059	0.066
D4	0.57 typ.			0.0225 typ.		
D5	3.98 typ.			0.157 typ.		
E	6.05	6.15	6.25	0.238	0.242	0.246
E1	5.79	5.89	5.99	0.228	0.232	0.236
E2	3.48	3.66	3.84	0.137	0.144	0.151
E3	3.68	3.78	3.91	0.145	0.149	0.154
E4	0.75 typ.			0.030 typ.		
e	1.27 BSC			0.050 BSC		
K	1.27 typ.			0.050 typ.		
K1	0.56	-	-	0.022	-	-
H	0.51	0.61	0.71	0.020	0.024	0.028
L	0.51	0.61	0.71	0.020	0.024	0.028
L1	0.06	0.13	0.20	0.002	0.005	0.008
θ	0°	-	12°	0°	-	12°
W	0.15	0.25	0.36	0.006	0.010	0.014
M	0.125 typ.			0.005 typ.		
ECN: S17-0173-Rev. L, 13-Feb-17						
DWG: 5881						

RECOMMENDED MINIMUM PADS FOR PowerPAK® SO-8 Single



Recommended Minimum Pads
Dimensions in Inches/(mm)

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