

SW50P03-VB Datasheet

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

PRODUCT SUMMARY

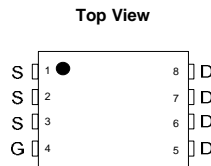
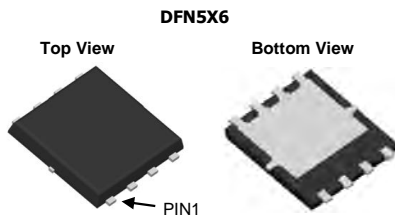
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^{e,f}	Q_g (Typ.)
- 30	0.0083 at $V_{GS} = -10$ V	- 35	24.6 nC
	0.0155 at $V_{GS} = -4.5$ V	- 35	

FEATURES

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

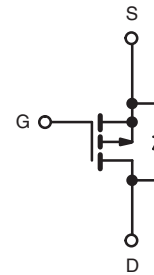


RoHS
COMPLIANT
HALOGEN
FREE



APPLICATIONS

- Load Switch
- Adaptor Switch
- Notebook PC



P-Channel MOSFET

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 °C)	T _C = 25 °C	I _D	- 35 ^e	A	
	T _C = 70 °C		- 35 ^e		
	T _A = 25 °C		- 16.1 ^{a, b}		
	T _A = 70 °C		- 12.9 ^{a, b}		
Pulsed Drain Current		I _{DM}	- 60		
Continuous Source-Drain Diode Current	T _C = 25 °C	I _S	- 30		
	T _A = 25 °C		- 3.5 ^{a, b}		
Avalanche Current	L = 0.1 mH	I _{AS}	- 25		
Single-Pulse Avalanche Energy		E _{AS}	31.25	mJ	
Maximum Power Dissipation	T _C = 25 °C	P _D	35.7	W	
	T _C = 70 °C		22.8		
	T _A = 25 °C		4.2 ^{a, b}		
	T _A = 70 °C		2.7 ^{a, b}		
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 50 to 150	°C	
Soldering Recommendations (Peak Temperature) ^{c, d}			260		

Notes:

- Package limited.
- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).

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

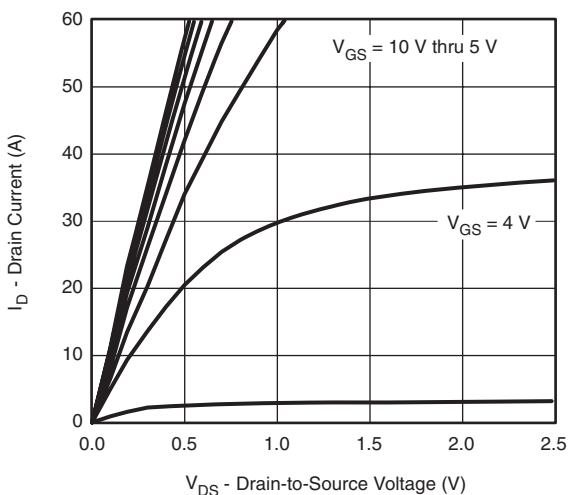
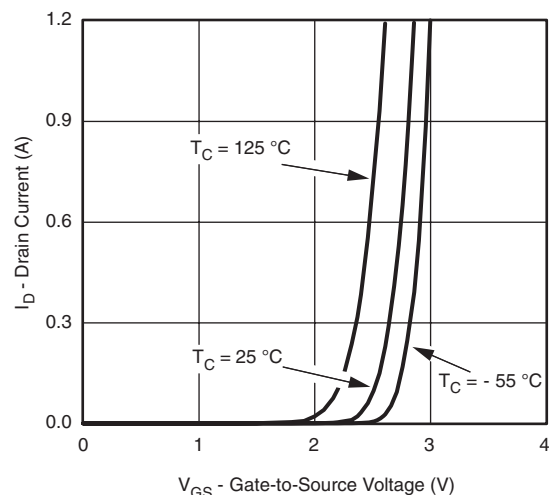
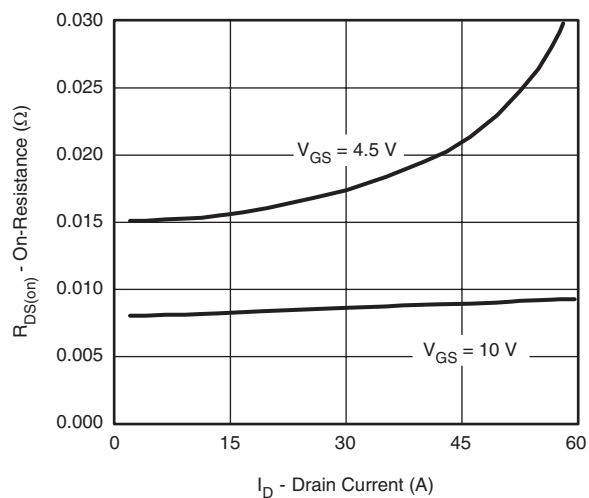
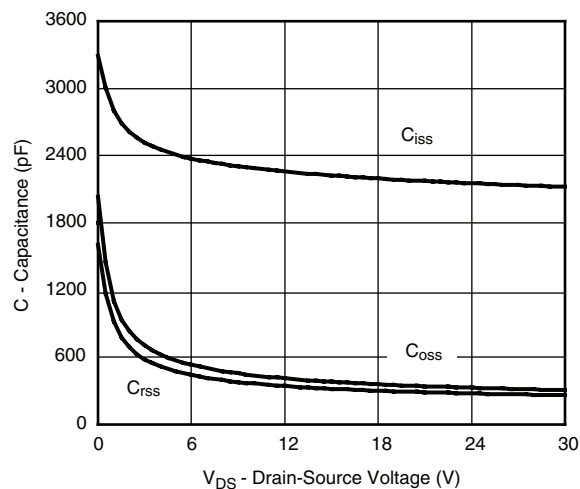
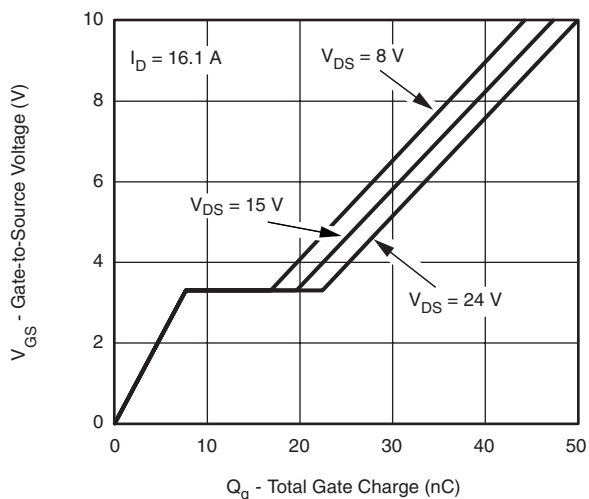
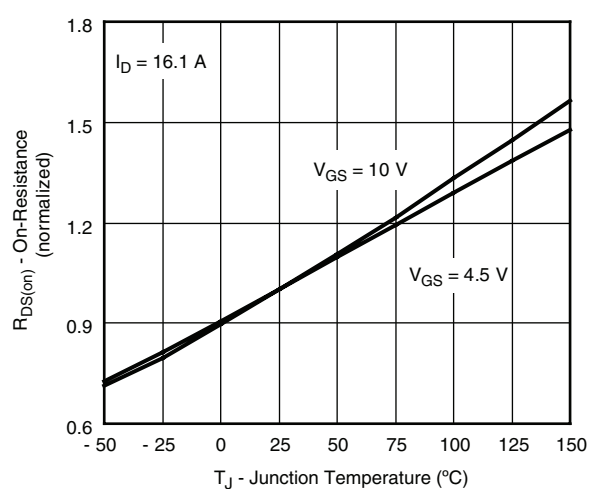
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 20		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			5		
Gate-Source Threshold 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	- 20			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 16.1 A		0.0083		Ω
		V _{GS} = - 4.5 V, I _D = 11.8 A		0.0155		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 16.1 A		37		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 15 V, V _{GS} = 0 V, f = 1 MHz		2230		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			- 30	A
Pulse Diode Forward Current ^a	I _{SM}				- 60	
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:

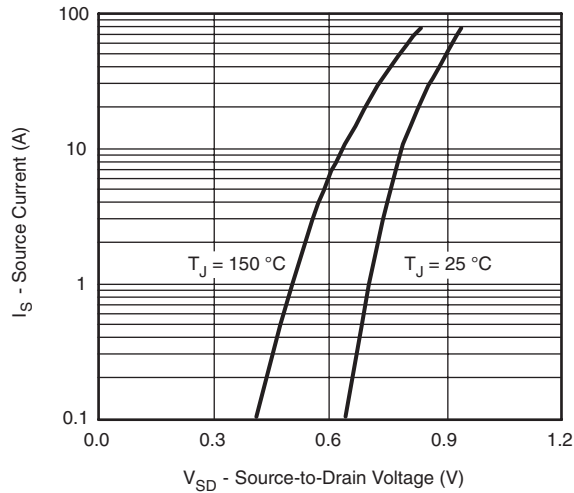
a. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.

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

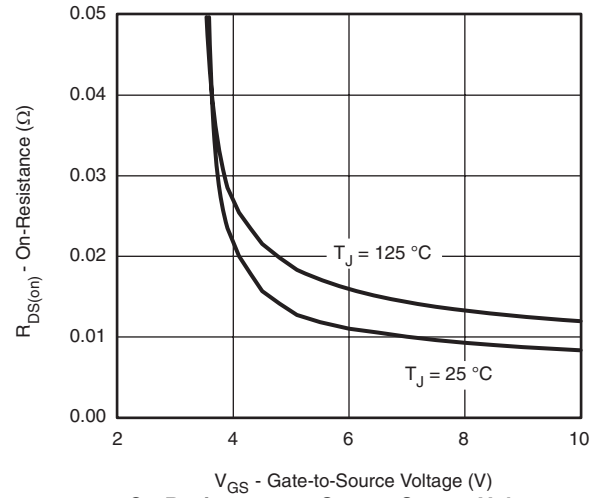
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

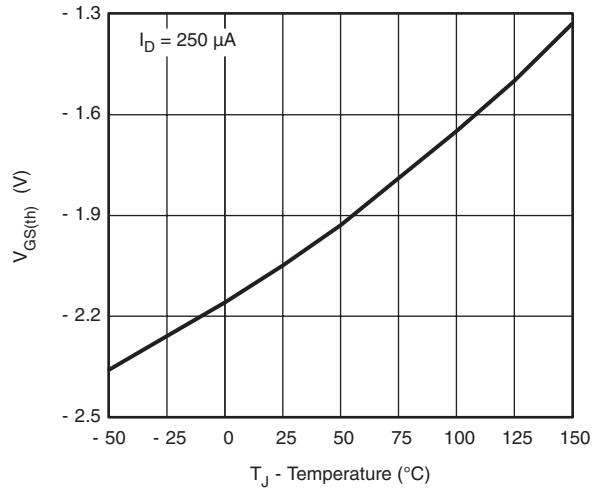
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



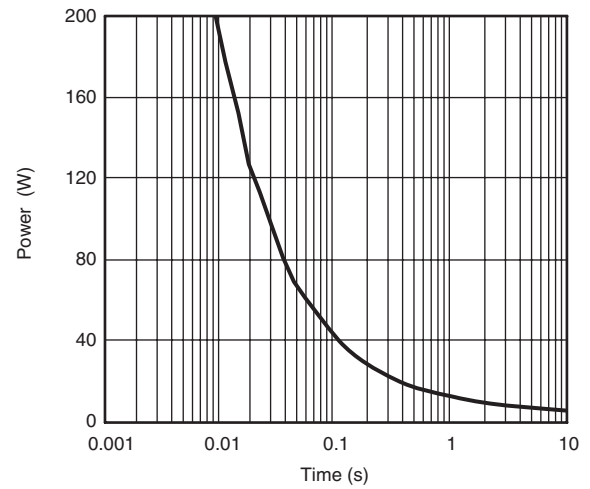
Source-Drain Diode Forward Voltage



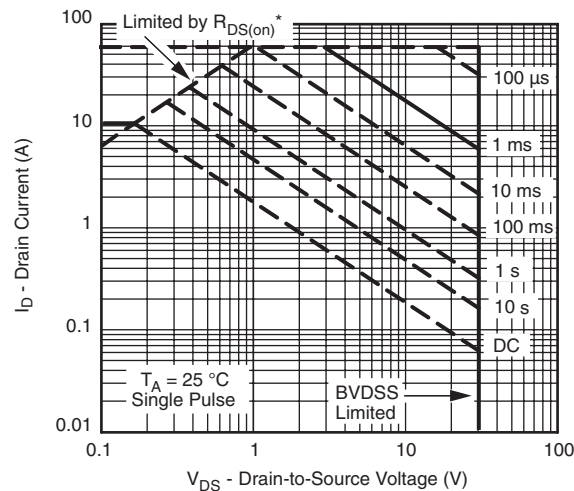
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



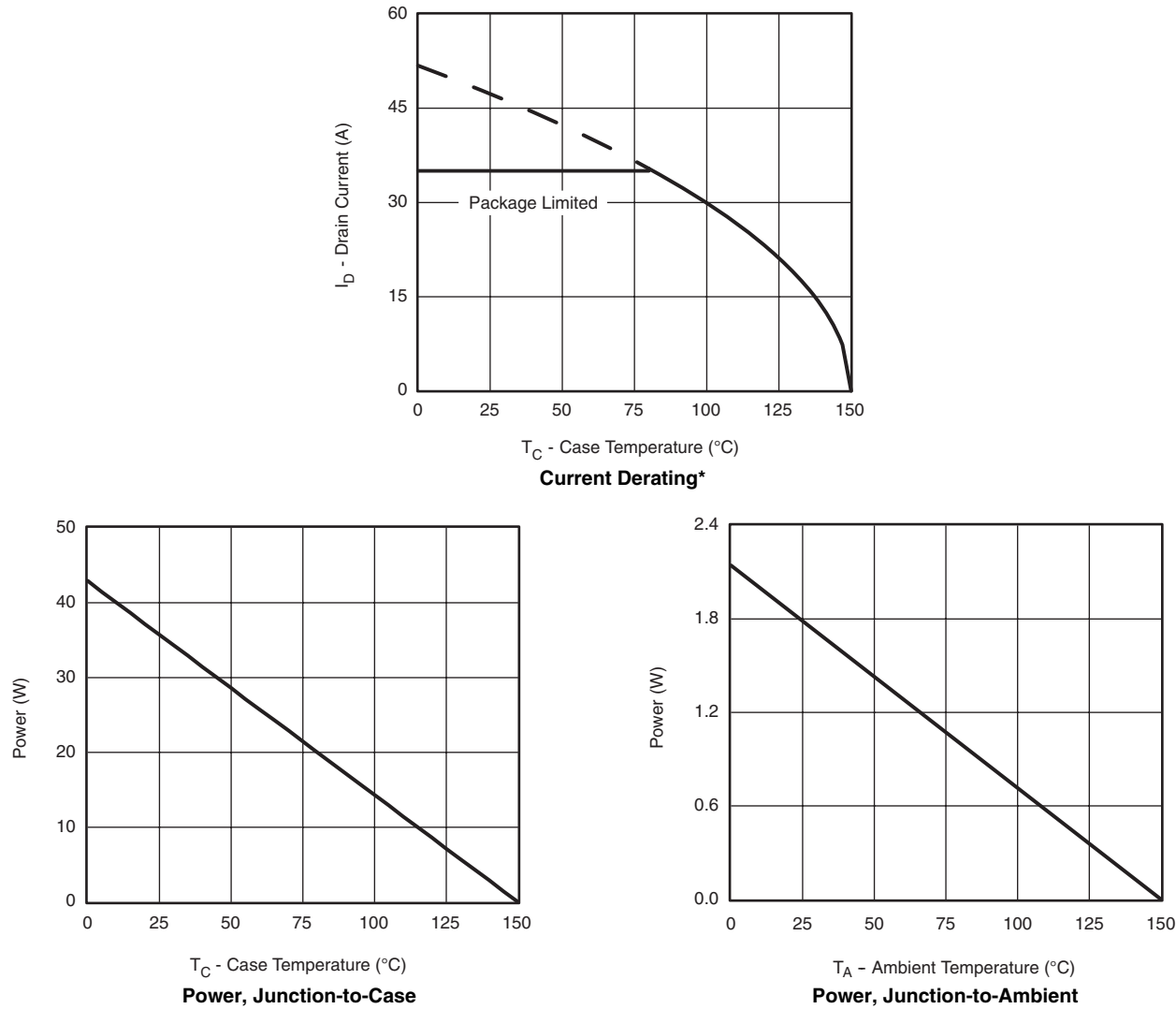
Single Pulse Power, Junction-to-Ambient



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

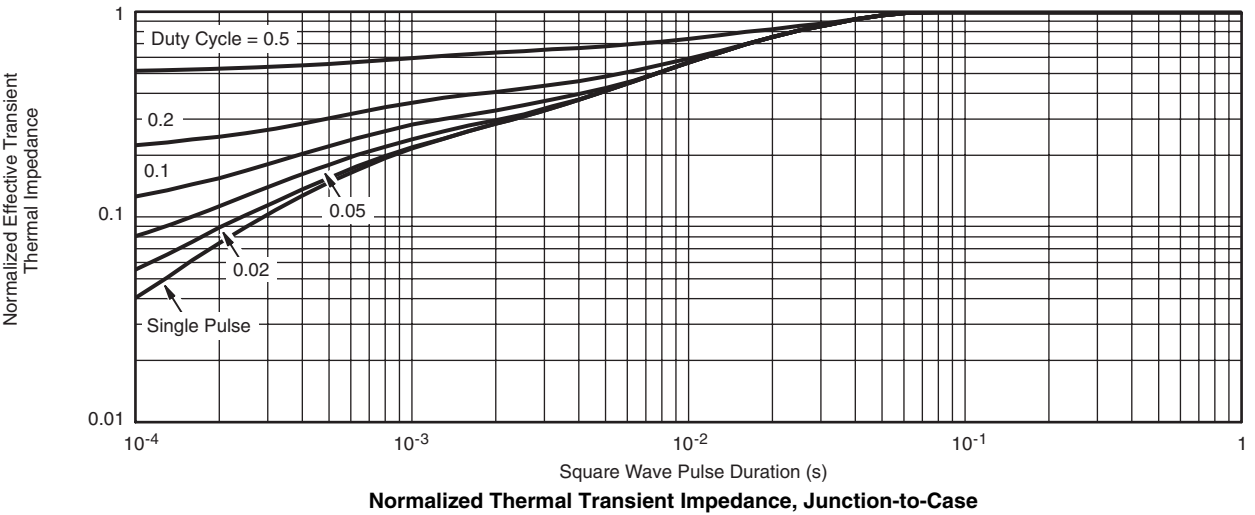
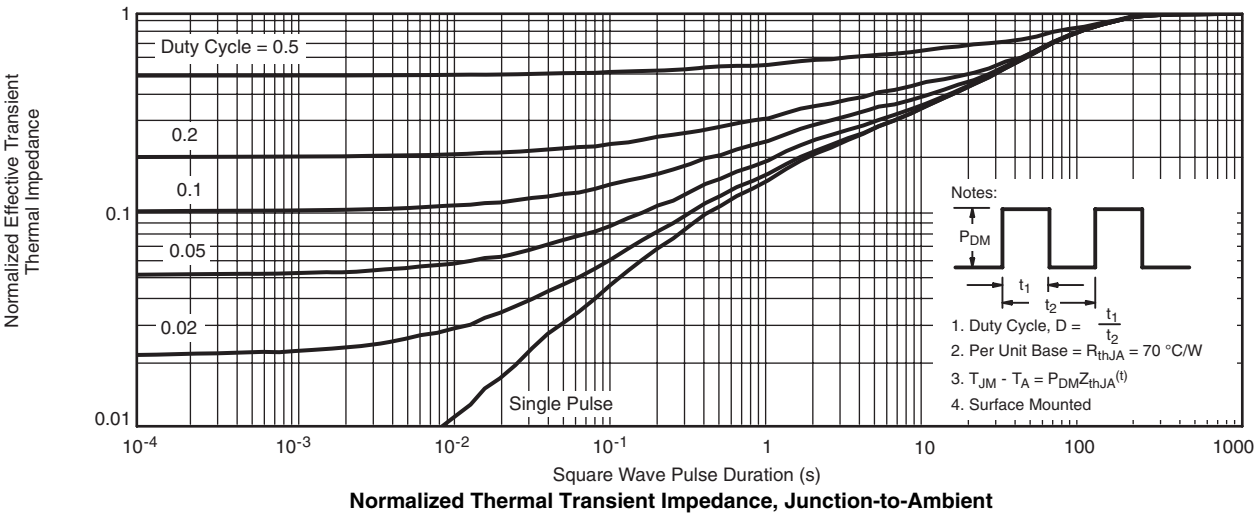
Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

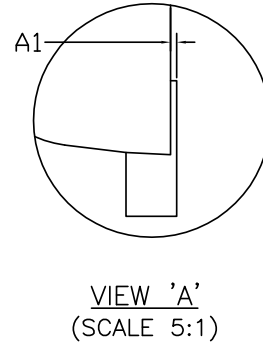
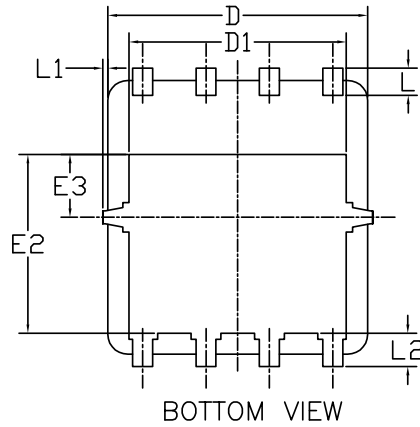
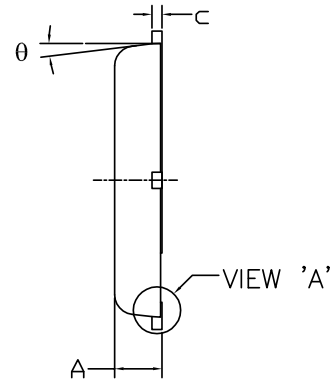
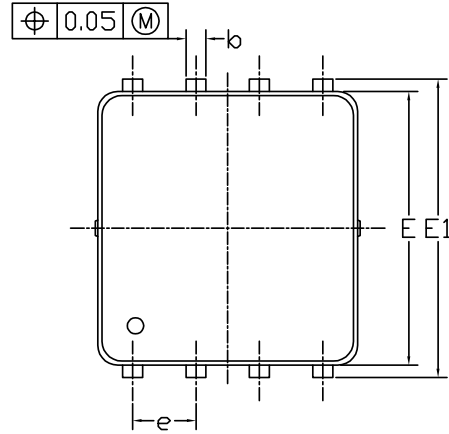


* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

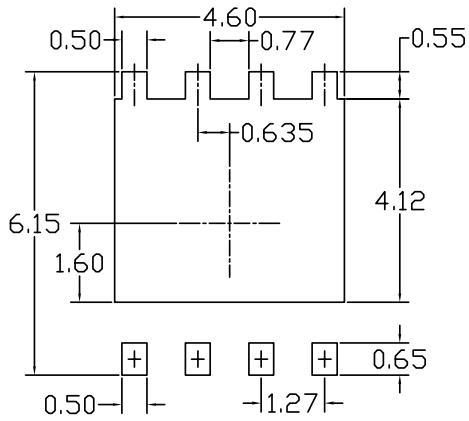
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



DFN5x6_8L_EP1_P PACKAGE OUTLIN



RECOMMENDED LAND PATTERN



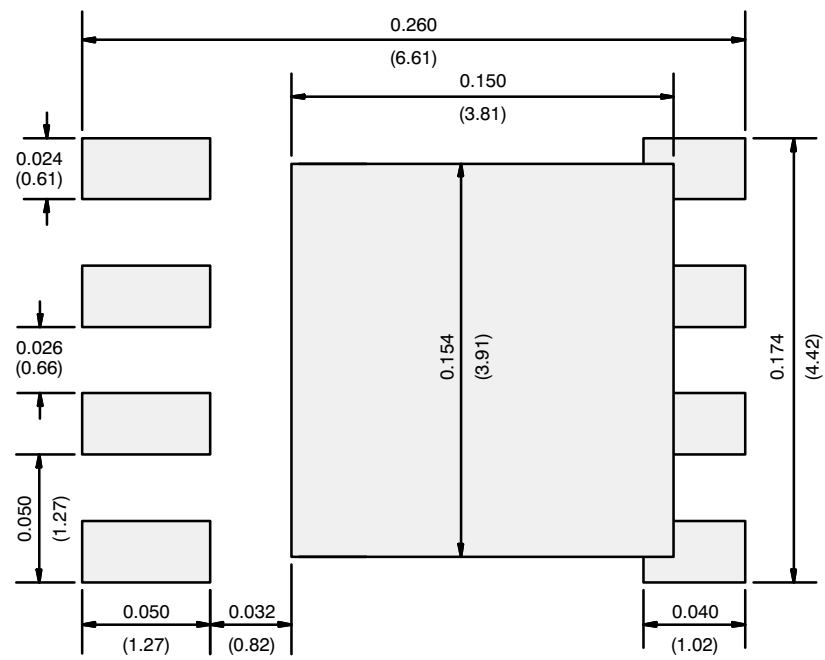
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.85	0.95	1.00	0.033	0.037	0.039
A1	0.00	---	0.05	0.000	---	0.002
b	0.30	0.40	0.50	0.012	0.016	0.020
c	0.15	0.20	0.25	0.006	0.008	0.010
D	5.10	5.20	5.30	0.201	0.205	0.209
D1	4.25	4.35	4.45	0.167	0.171	0.175
E	5.45	5.55	5.65	0.215	0.219	0.222
E1	5.95	6.05	6.15	0.234	0.238	0.242
E2	3.525	3.625	3.725	0.139	0.143	0.147
E3	1.175	1.275	1.375	0.046	0.050	0.054
e	1.27 BSC			0.050 BSC		
L	0.45	0.55	0.65	0.018	0.022	0.026
L1	0	---	0.15	0	---	0.006
L2	0.68 REF			0.027 REF		
θ	0°	---	10°	0°	---	10°

NOTE

UNIT: mm

- PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 6 MILS EACH.
- CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

RECOMMENDED MINIMUM PADS FOR DFN5 x 6



Recommended Minimum Pads
Dimensions in Inches/(mm)

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