N-Channel 30V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (mΩ) (Max.)	I_D (A)[a, g]
30	2.0 at V_{GS} = 10 V	50
	2.7 at V_{GS} = 4.5 V	50

Features

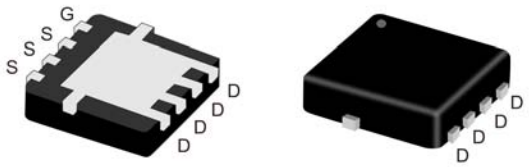
- Very Low RDS(on) at 4.5V Vgs
- Low Gate Charge
- High Current Capability
- 100% Rg and UIS Tested
- RoHS and Halogen-Free Compliant

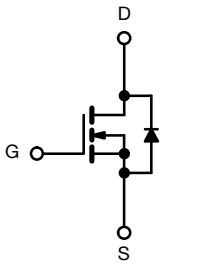
Applications

- Synchronous Rectification
- High Power Density DC/DC
- VRMs and Embedded DC/DC

Pin Configuration

Power5x6





N-Channel MOSFET

Absolute Maximum Ratings

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	+ 20, - 16	V
Continuous Drain Current[G]	T_C=25℃	I_D	50[g]	A
	T_C = 70 °C		50[g]	
Pulsed Drain Current [C]		I_{DM}	100	
Continuous Drain Current	T_A=25℃	I_{DSM}	37.3[b, c]	A
	T_A=70℃		29.8[b, c]	
Avalanche Current [C]		I_{AS}, I_{AR}	30	A
Avalanche energy L=0.1mH [C]		E_{AS}, E_{AR}	45	mJ
Power Dissipation [B]	T_C=25℃	P_D	71.4	W
	T_C= 70 °C		45.7	
Power Dissipation [A]	T_A=25℃	P_{DSM}	5[b, c]	W
	T_A=70℃		3.2[b, c]	
Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to 150	℃

Thermal Data

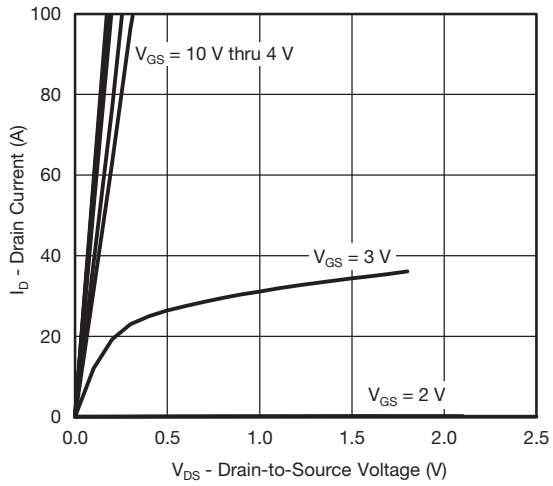
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	20	25	℃/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.4	1.75	℃/W

Electrical Characteristics (T_J=25℃ Unless Otherwise Specified)

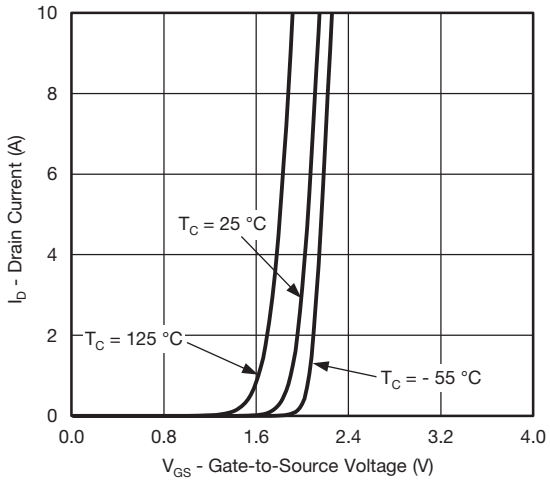
Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS}=0V	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V			1	μA
		T_J=55℃			10	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= + 20, - 16 V			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250μA	1.1		2.2	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=15A		1.65	2.0	mΩ
		V_{GS}=4.5V, I_D=10A		2.15	2.7	mΩ
g_{FS}	Forward Transconductance	V_{DS}=10V,I_D=15A		110		S
V_{SD}	Diode Forward Voltage	I_S=5A,V_{GS}=0V		0.73	1.1	V
I_S	Maximum Body-Diode Continuous Current[G]				100	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		6150		pF
C_{oss}	Output Capacitance			1615		pF
C_{rss}	Reverse Transfer Capacitance			141		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.3	1.05	2.1	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=10A		78	117	nC
Q_g(4.5V)	Total Gate Charge	V_{GS}=10V, V_{DS}=4.5V, I_D=10A		34.3	52	nC
Q_{gs}	Gate Source Charge			13.6		nC
Q_{gd}	Gate Drain Charge			4.1		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=4.5V, V_{DS}=15V, R_L1.5Ω, R_{GEN}=1Ω		31	60	ns
t_r	Turn-On Rise Time			18	35	ns
$t_{D(off)}$	Turn-Off DelayTime			38	75	ns
t_f	Turn-Off Fall Time			10	20	ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=10A, dI/dt=100A/μs		51	100	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=10A, dI/dt=100A/μs		46	90	nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design, and the maximum temperature of 150° C may be used if the PCB allows it.
B. The power dissipation P_D is based on $T_{J(MAX)}$=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to case $R_{\theta JC}$ and case to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.
G. The maximum current rating is package limited.
H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

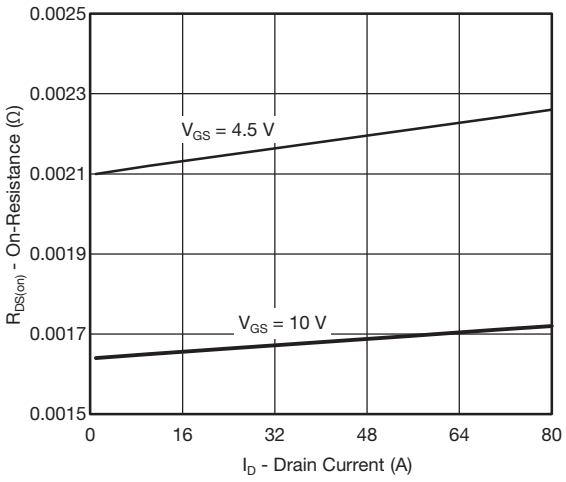
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



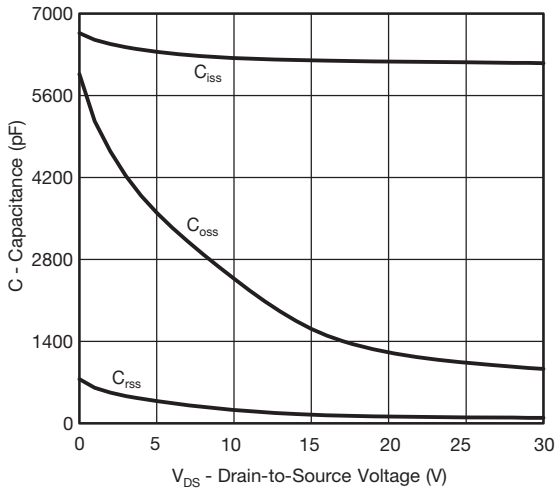
Output Characteristics



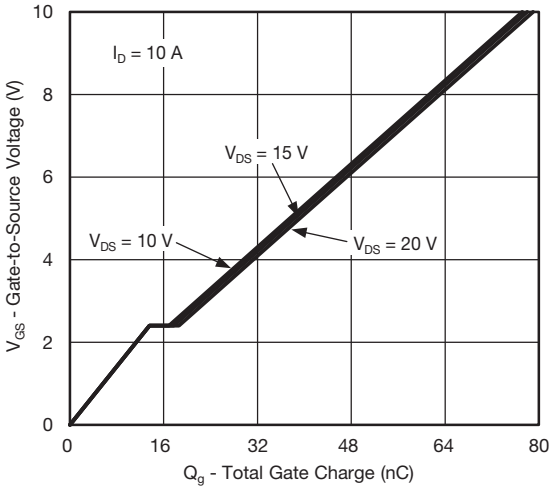
Transfer Characteristics



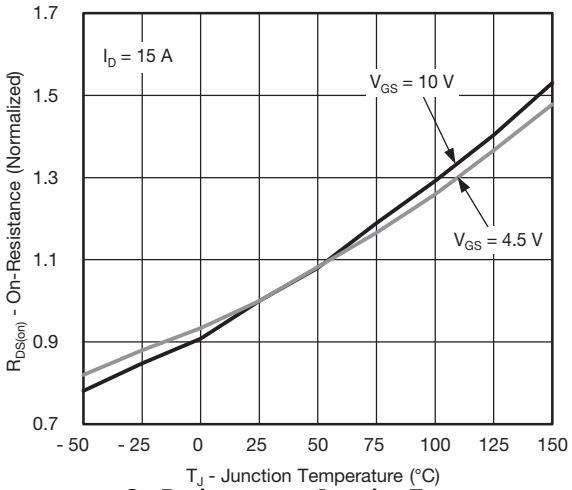
On-Resistance vs. Drain Current



Capacitance

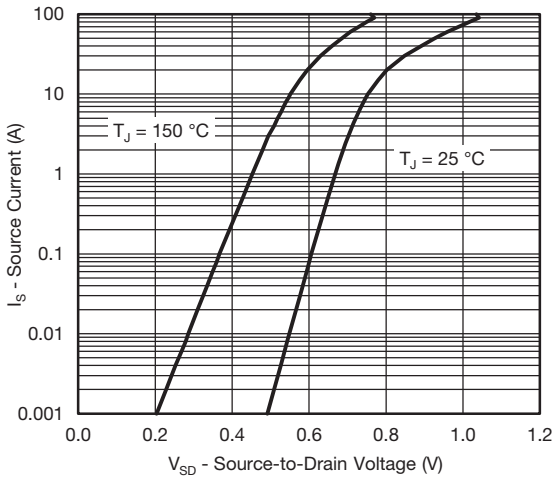


Gate Charge

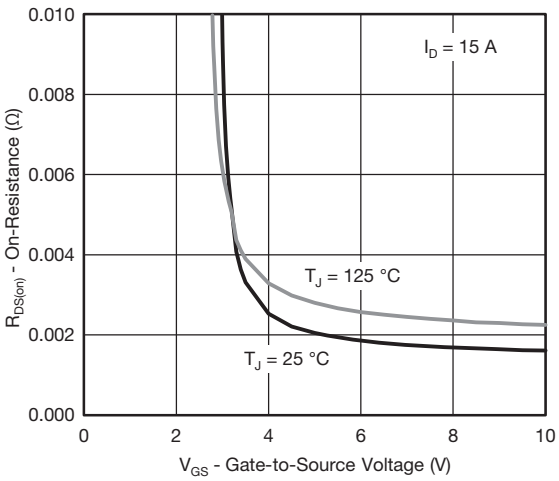


On-Resistance vs. Junction Temperature

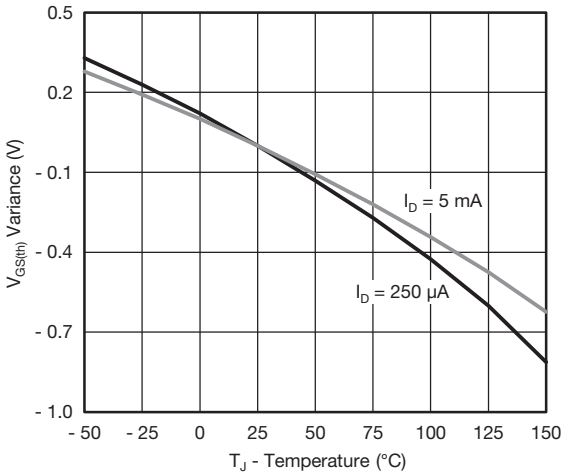
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



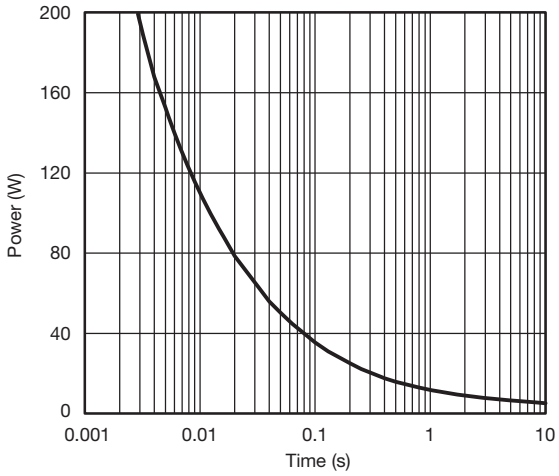
Source-Drain Diode Forward Voltage



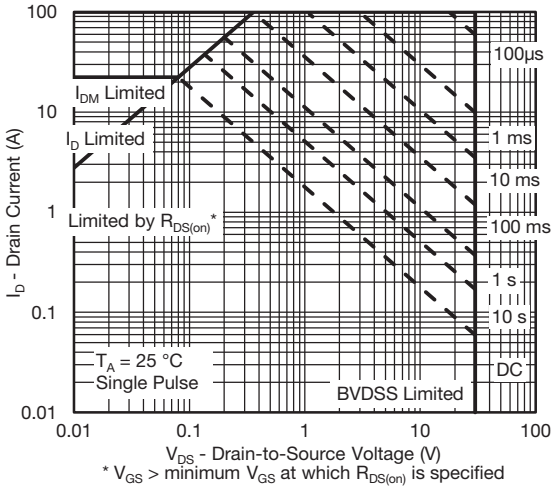
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

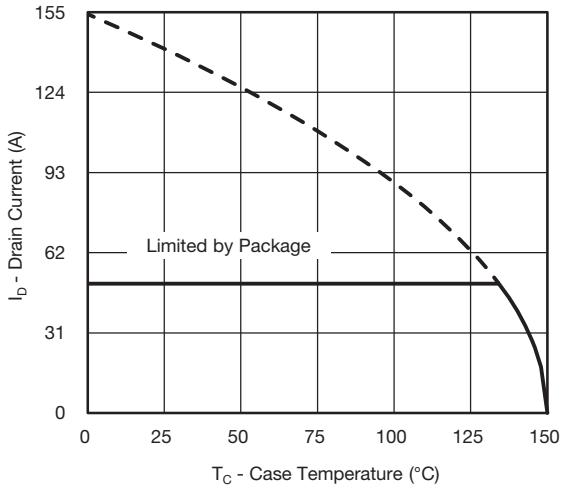


Single Pulse Power, Junction-to-Ambient

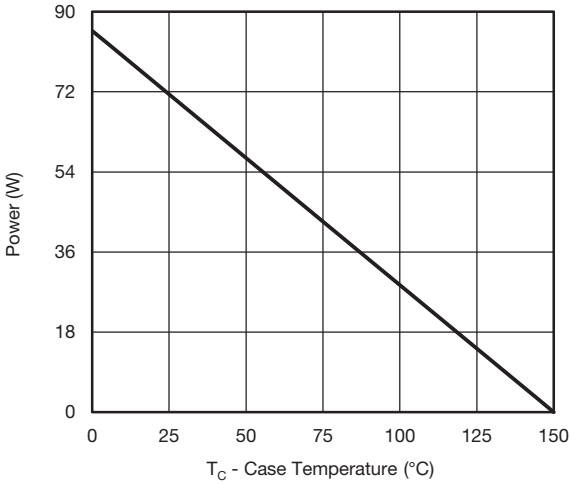


Safe Operating Area

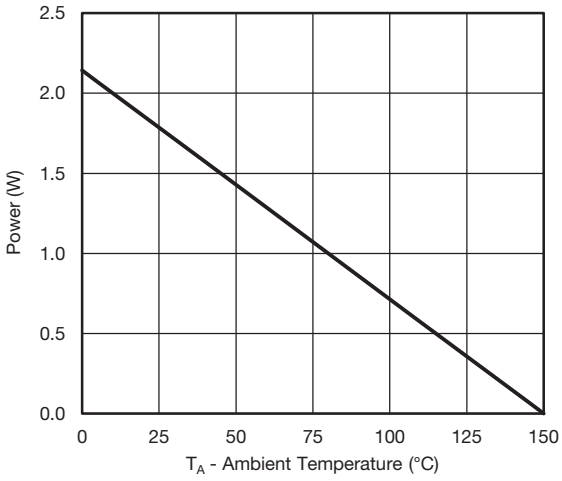
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



Current Derating*

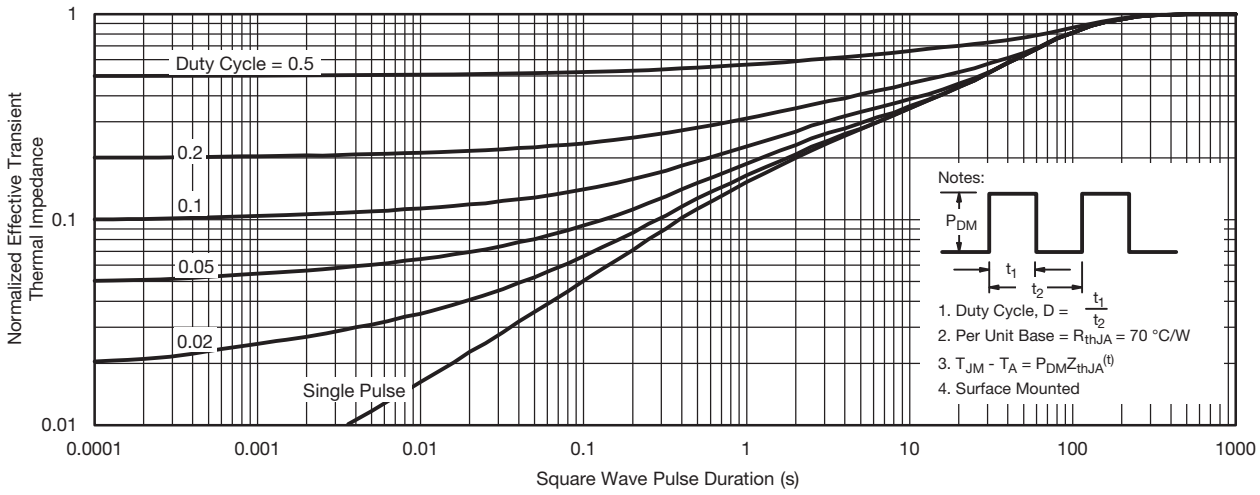


Power, Junction-to-Case

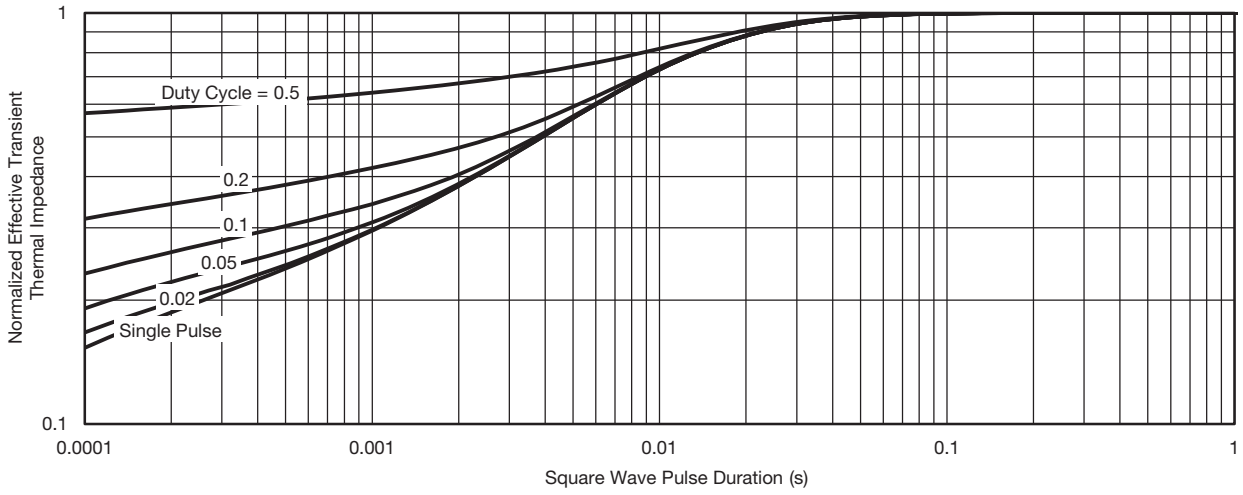


Power, Junction-to-Ambient

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

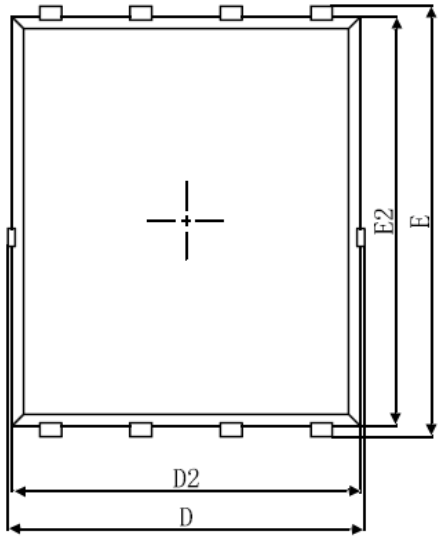


Normalized Thermal Transient Impedance, Junction-to-Ambient

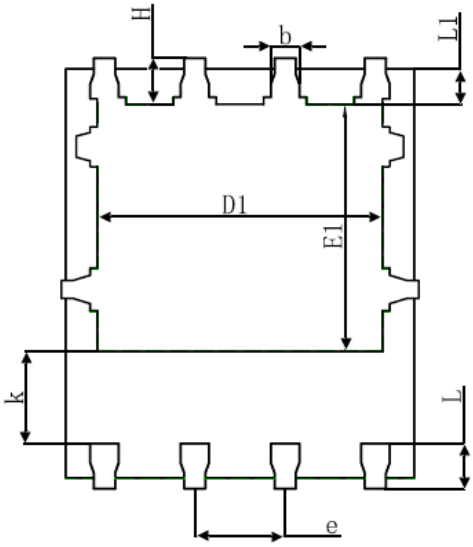


Normalized Thermal Transient Impedance, Junction-to-Case

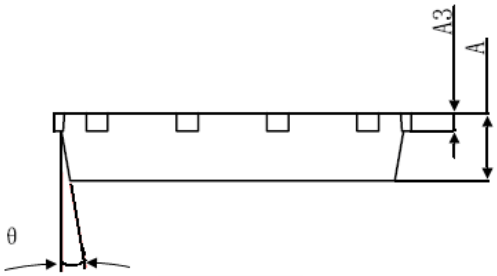
Power5x6 Package Information



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	8°	12°	8°	12°