

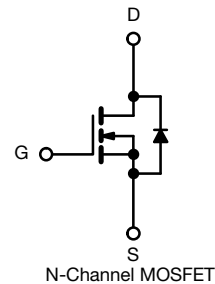
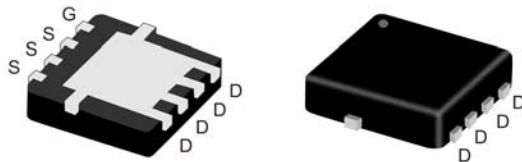
## N-Channel 30V (D-S) MOSFET

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
30	0.006 at V <sub>GS</sub> = 10 V	35
	0.008 at V <sub>GS</sub> = 4.5 V	35

### Pin Configuration

Power5x6



### Features

- Very Low R<sub>DS(on)</sub> at 4.5V V<sub>gs</sub>
- Low Gate Charge
- High Current Capability
- 100% R<sub>g</sub> and UIS Tested
- RoHS and Halogen-Free Compliant

### Applications

- Synchronous Rectification
- Networking DC-DC Power System
- Power Tool Application

### Absolute Maximum Ratings

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	V
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> = 25°C	A
		T <sub>C</sub> = 70 °C	
Pulsed Drain Current	I <sub>DM</sub>	70	
Continuous Drain Current	I <sub>DSM</sub>	T <sub>A</sub> = 25°C	A
		T <sub>A</sub> = 70°C	
Avalanche Current	I <sub>AS</sub> , I <sub>AR</sub>	35	A
Avalanche energy L=0.1mH <sup>C</sup>	E <sub>AS</sub> , E <sub>AR</sub>	61	mJ
Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25°C	W
		T <sub>C</sub> = 70 °C	
Power Dissipation	P <sub>MDS</sub>	T <sub>A</sub> = 25°C	W
		T <sub>A</sub> = 70°C	
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

### Thermal Data

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient	R <sub>θJA</sub>	25	30	°C/W
Maximum Junction-to-Case	R <sub>θJC</sub>	2.9	3.5	°C/W

**Electrical Characteristics (T<sub>J</sub> = 25 °C Unless Otherwise Specified)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ± 20 V			± 100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	1.15		2.2	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	50			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		4.8	6	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =17.5A		6.4	8	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 15V, I <sub>D</sub> =20A		82		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> = 10A, V <sub>GS</sub> = 0V		0.8	1.2	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current <sup>G</sup>	T <sub>C</sub> = 25 °C			30	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		1700		pF
C <sub>oss</sub>	Output Capacitance			350		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			140		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.2	2.4	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10V, I <sub>D</sub> =20A		28	42	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge	V <sub>DS</sub> =15V V <sub>GS</sub> = 4.5 V, I <sub>D</sub> =20A,		12	21	nC
Q <sub>gs</sub>	Gate Source Charge			5.4		nC
Q <sub>gd</sub>	Gate Drain Charge			4.6		nC
t <sub>D(on)</sub>	Turn-On DelayTime		V <sub>DD</sub> = 15 V, R <sub>L</sub> = 1.5 Ω I <sub>D</sub> ≅ 10A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 1 Ω		25	40
t <sub>r</sub>	Turn-On Rise Time			20	30	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			25	40	ns
t <sub>f</sub>	Turn-Off Fall Time			15	25	ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =10A, di/dt=100A/μs, T <sub>J</sub> =25 °C			25	50
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =10A, di/dt=100A/μs, T <sub>J</sub> =25 °C		17	35	nC

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub> = 25° C. The Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> 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<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>J(MAX)</sub>=150° C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.

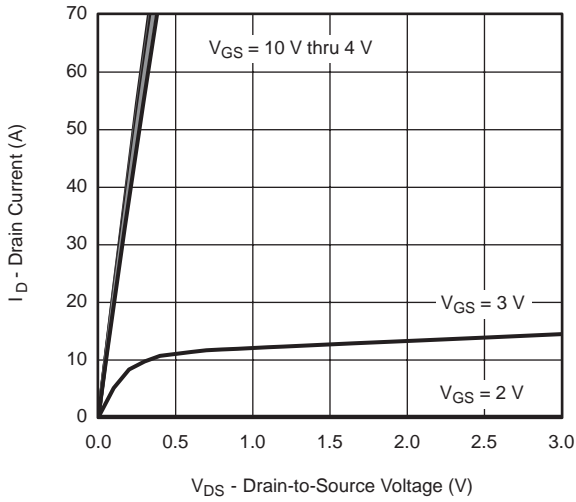
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

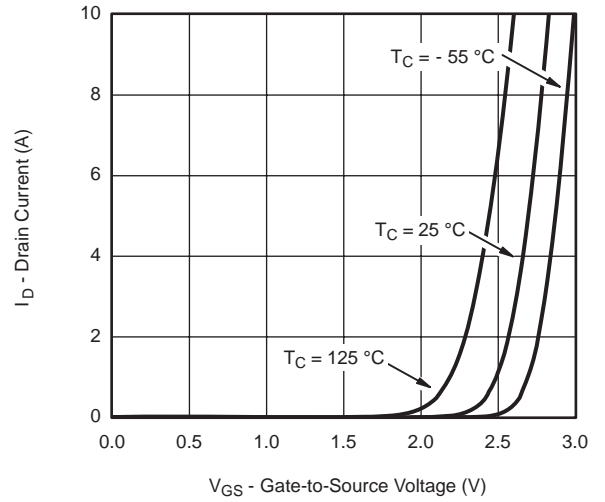
G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C.

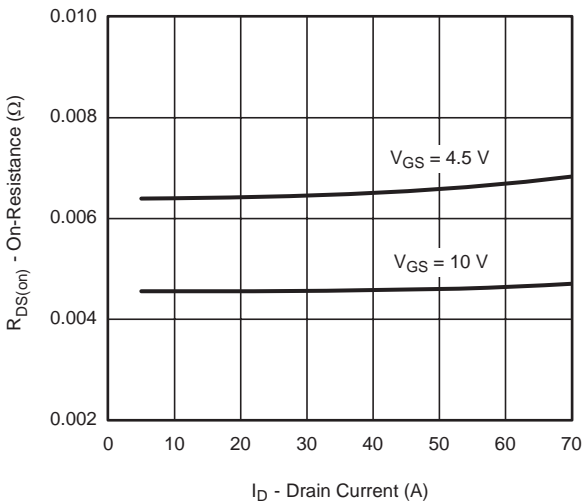
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



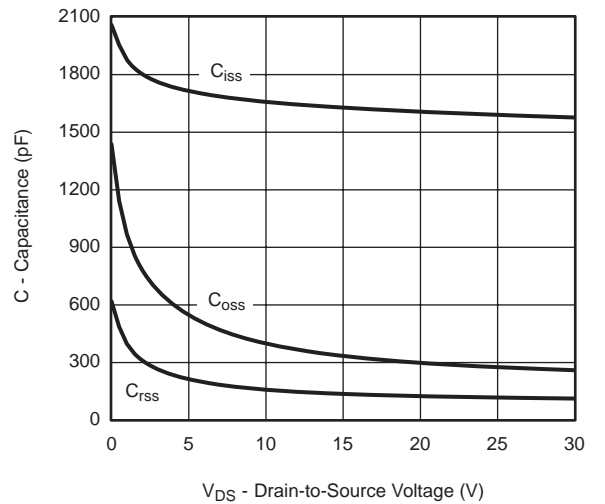
Output Characteristics



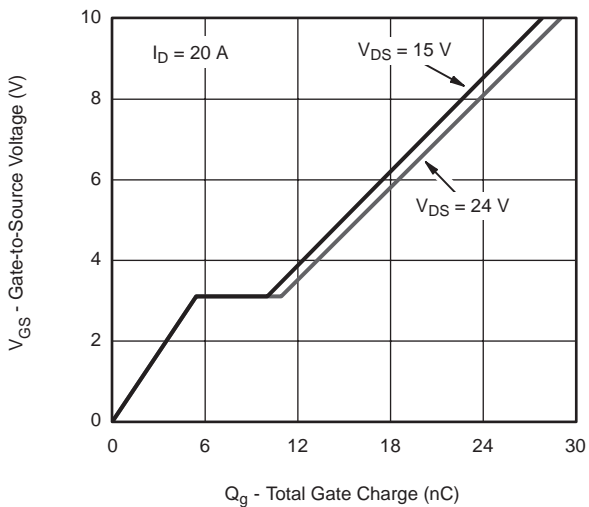
Transfer Characteristics



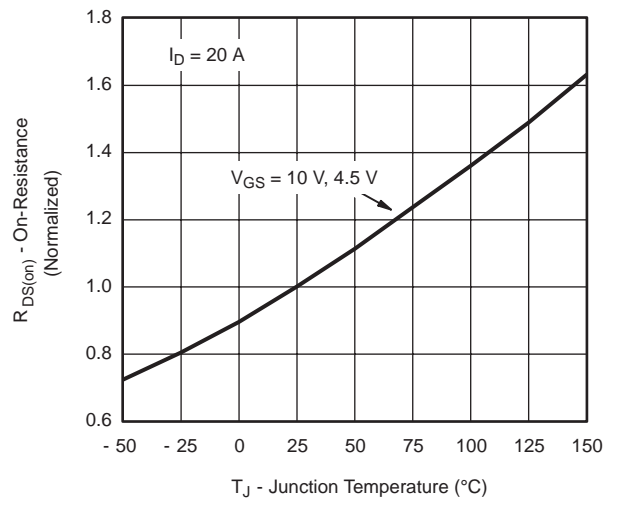
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

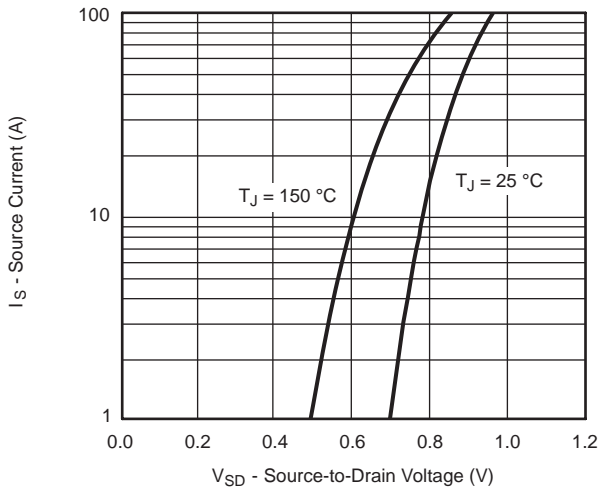


Gate Charge

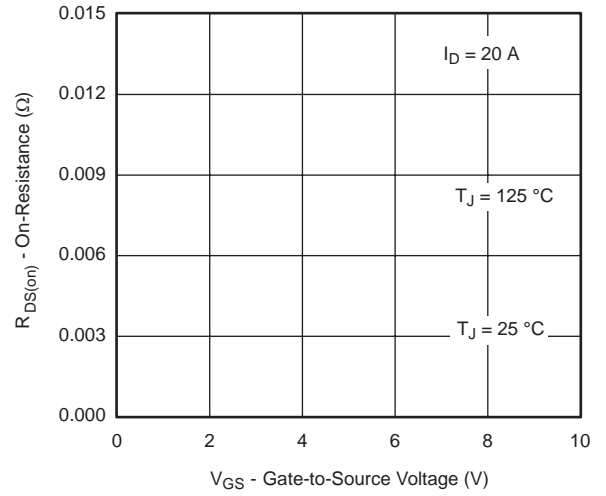


On-Resistance vs. Junction Temperature

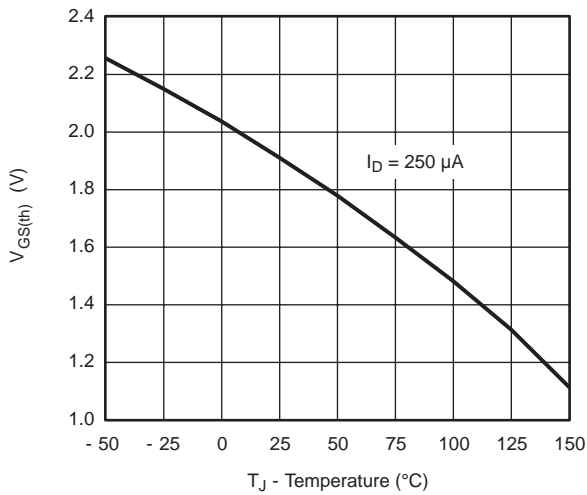
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



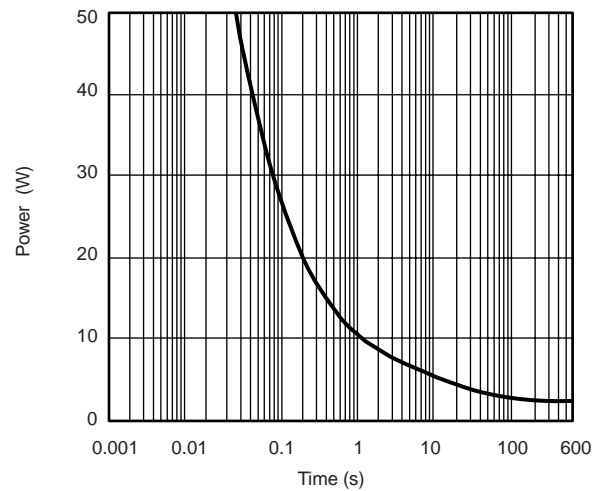
**Source-Drain Diode Forward Voltage**



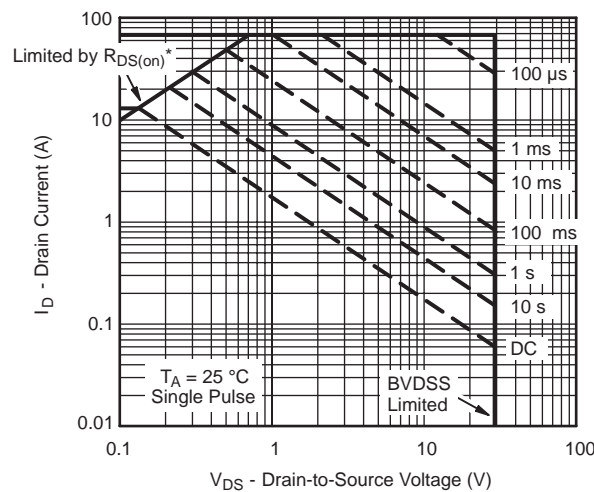
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



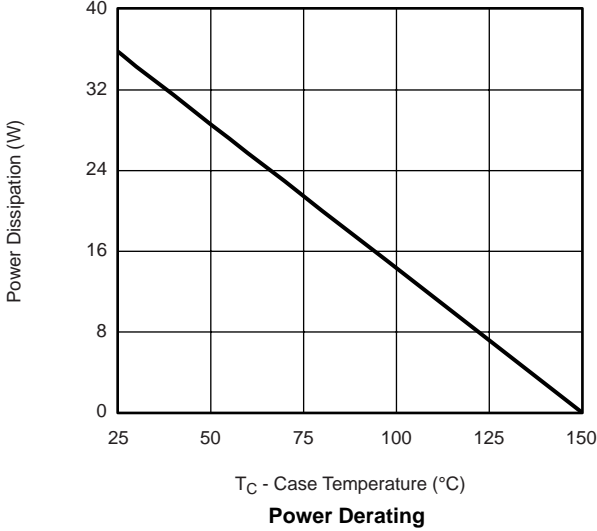
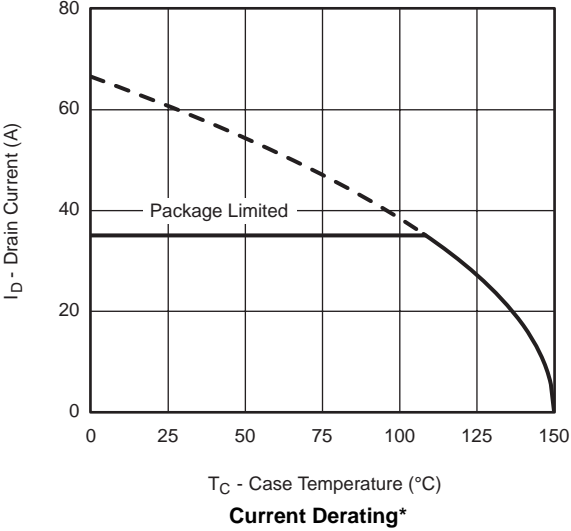
**Single Pulse Power (Junction-to-Ambient)**



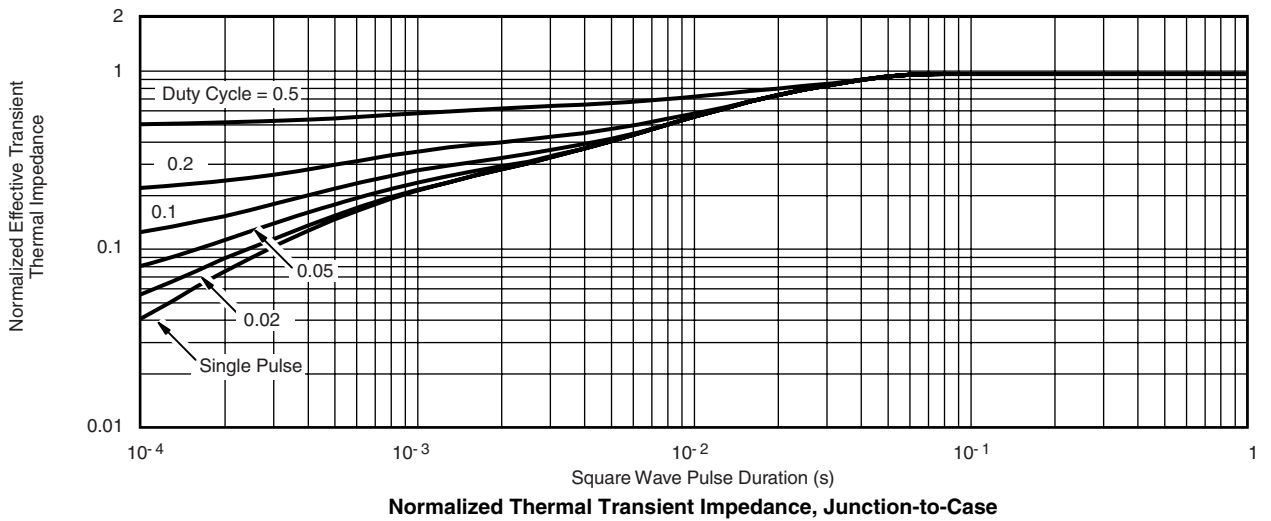
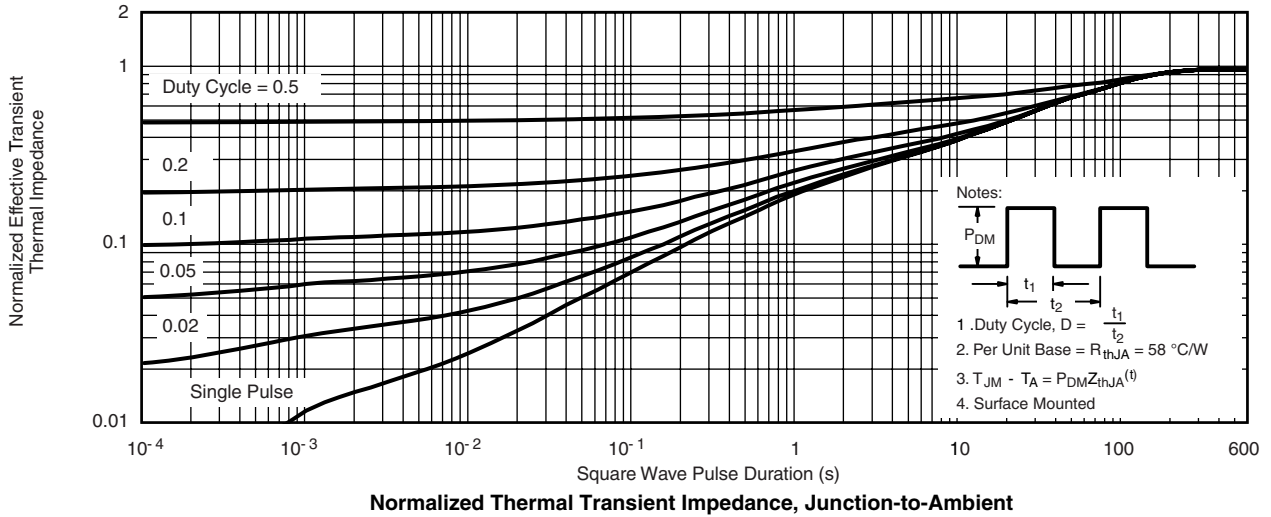
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area, Junction-to-Ambient**

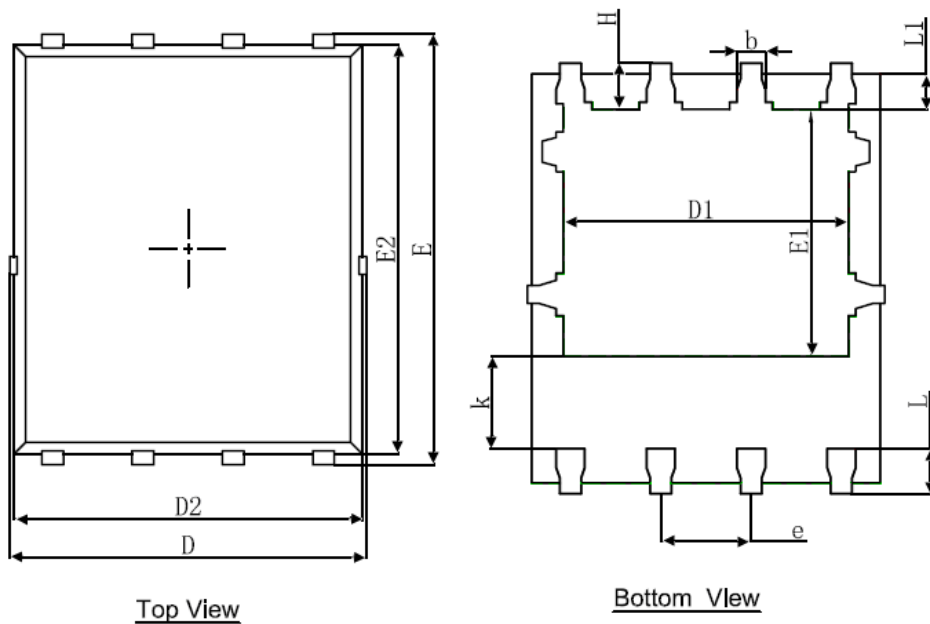
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



## 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
$\theta$	8°	12°	8°	12°