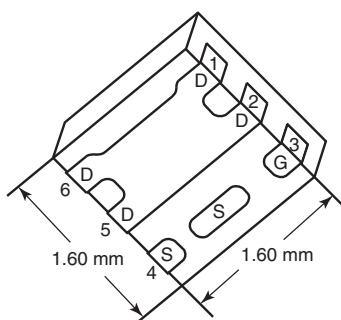


N-Channel 12 V (D-S) MOSFET

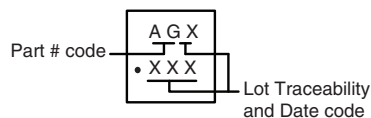
PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
12	0.020 at $V_{GS} = 4.5$ V	9	7.5 nC
	0.024 at $V_{GS} = 2.5$ V	9	
	0.029 at $V_{GS} = 1.8$ V	9	

PowerPAK SC-75-6L-Single



Marking Code



Ordering Information: SiB488DK-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

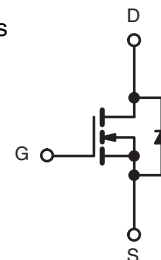
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- New Thermally Enhanced PowerPAK[®] SC-75 Package
 - Small Footprint Area
 - Low On-Resistance
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch, PA Switch and Battery Switch for Portable Devices
- High Frequency dc-to-dc Converters



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	12	V
Gate-Source Voltage	V_{GS}	± 8	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	9^a	A
	$T_C = 70$ °C	9^a	
	$T_A = 25$ °C	$9^{b,c}$	
	$T_A = 70$ °C	$7.2^{b,c}$	
Pulsed Drain Current	I_{DM}	35	A
Continuous Source-Drain Diode Current	$T_C = 25$ °C	9^a	
	$T_A = 25$ °C	$2^{b,c}$	
Maximum Power Dissipation	$T_C = 25$ °C	13	W
	$T_C = 70$ °C	8.4	
	$T_A = 25$ °C	$2.4^{b,c}$	
	$T_A = 70$ °C	$1.6^{b,c}$	
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, f}	R_{thJA}	41	51	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	7.5	9.5	

Notes:

- $T_C = 25$ °C, package limited.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- See Solder Profile (www.vishay.com/doc?73257). The PowerPAK SC-75 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.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is 105 °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	12			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		11		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 2.7		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.4		1.0	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 12 V, V _{GS} = 0 V			1	μA
		V _{DS} = 12 V, V _{GS} = 0 V, T _J = 55 °C			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 4.5 V	15			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 6.3 A		0.016	0.020	Ω
		V _{GS} = 2.5 V, I _D = 5.8 A		0.019	0.024	
		V _{GS} = 1.8 V, I _D = 2.5 A		0.023	0.029	
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 6.3 A		32		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 6 V, V _{GS} = 0 V, f = 1 MHz		725		pF
Output Capacitance	C _{oss}			195		
Reverse Transfer Capacitance	C _{rss}			90		
Total Gate Charge	Q _g	V _{DS} = 6 V, V _{GS} = 8 V, I _D = 9 A		13.1	20	nC
		V _{DS} = 6 V, V _{GS} = 4.5 V, I _D = 9 A		7.5	12	
Gate-Source Charge	Q _{gs}			1.1		
Gate-Drain Charge	Q _{gd}			0.8		
Gate Resistance	R _g	f = 1 MHz	0.5	2.5	5	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 6 V, R _L = 0.83 Ω I _D ≅ 7.2 A, V _{GEN} = 4.5 V, R _g = 1 Ω		10	15	ns
Rise Time	t _r			10	15	
Turn-Off Delay Time	t _{d(off)}			20	30	
Fall Time	t _f			10	15	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 6 V, R _L = 0.83 Ω I _D ≅ 7.2 A, V _{GEN} = 8 V, R _g = 1 Ω		5	10	
Rise Time	t _r			10	15	
Turn-Off Delay Time	t _{d(off)}			20	30	
Fall Time	t _f			10	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			9	A
Pulse Diode Forward Current	I _{SM}				35	
Body Diode Voltage	V _{SD}	I _S = 7.2 A, V _{GS} = 0 V		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 7.2 A, dI/dt = 100 A/μs, T _J = 25 °C		15	30	ns
Body Diode Reverse Recovery Charge	Q _{rr}			4	8	nC
Reverse Recovery Fall Time	t _a			8		ns
Reverse Recovery Rise Time	t _b			7		

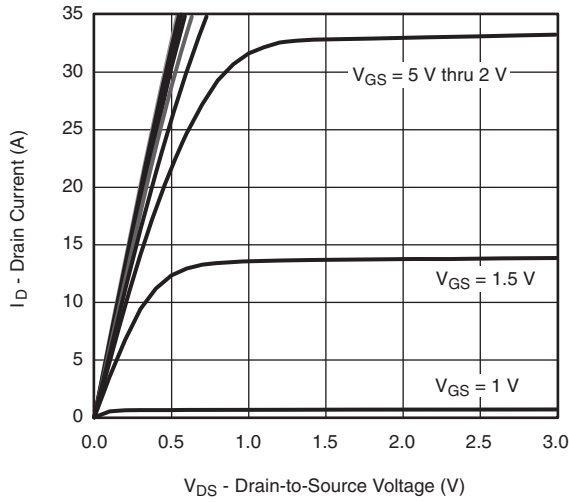
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

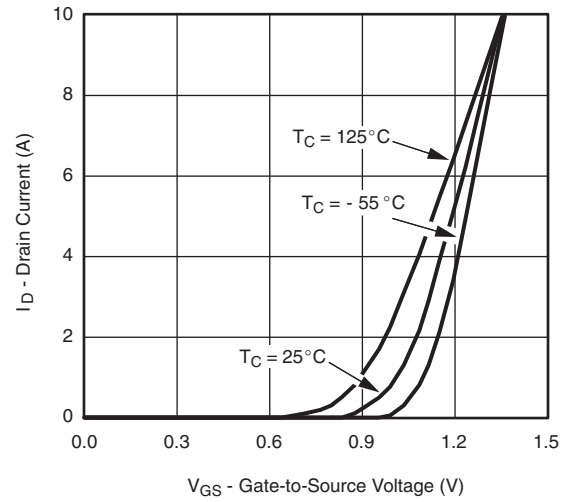
b. Guaranteed by design, not subject to production testing.

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.

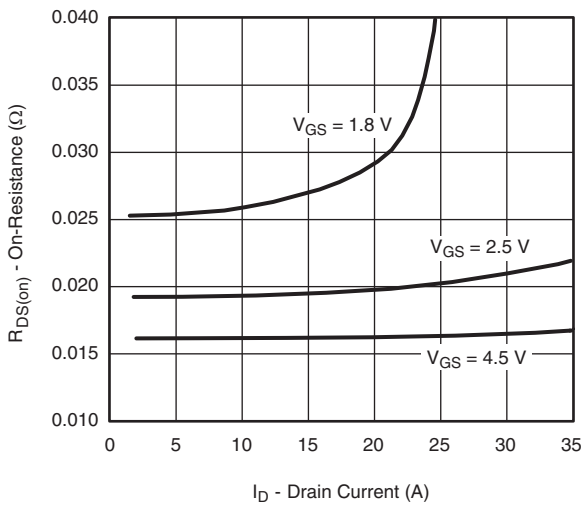
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



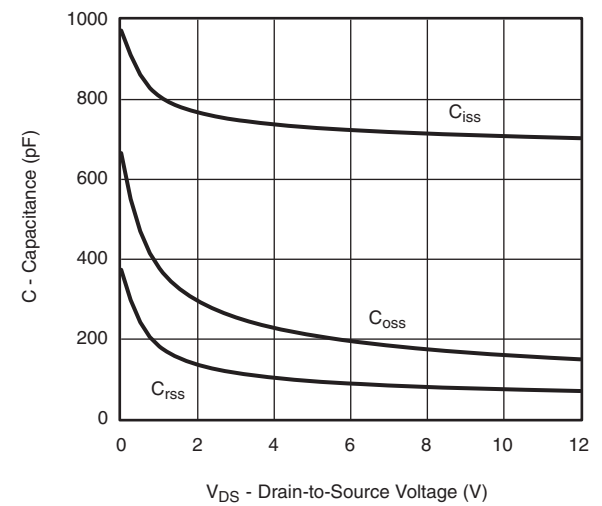
Output Characteristics



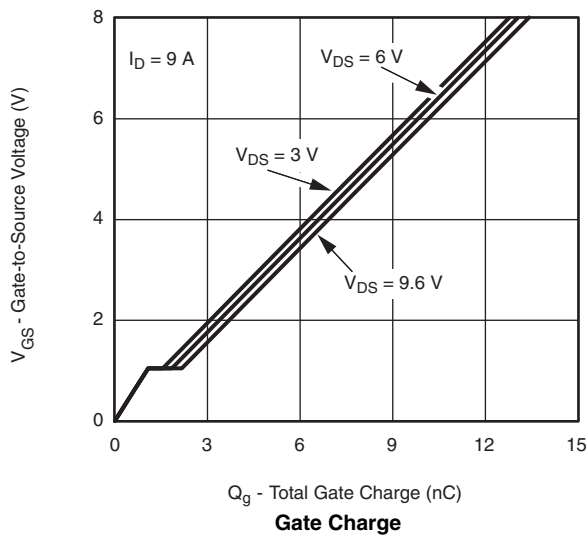
Transfer Characteristics



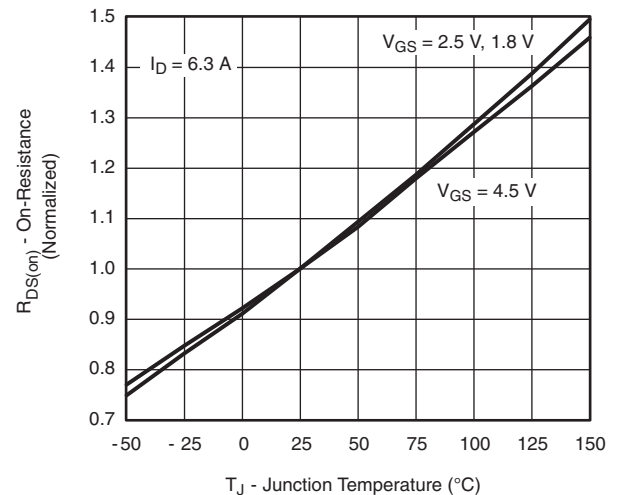
On-Resistance vs. Drain Current and Gate Voltage



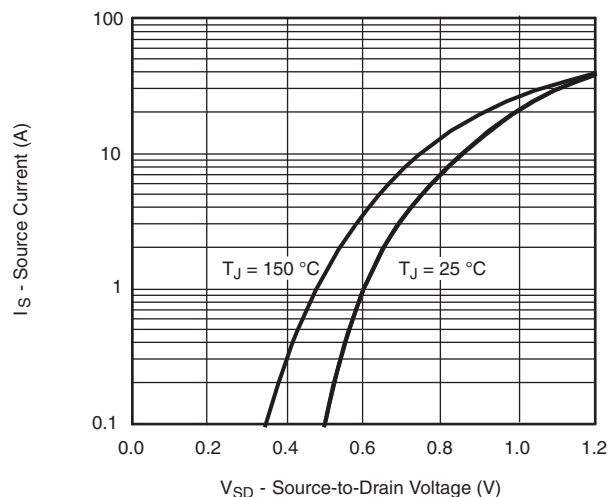
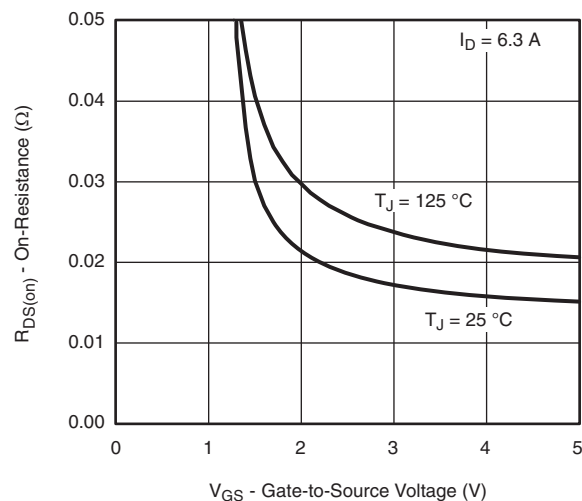
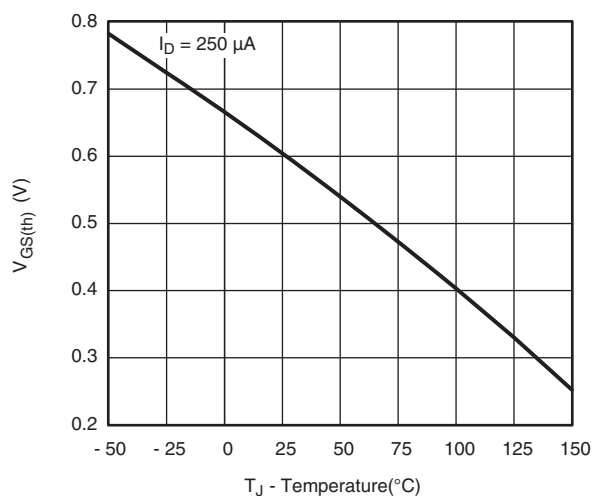
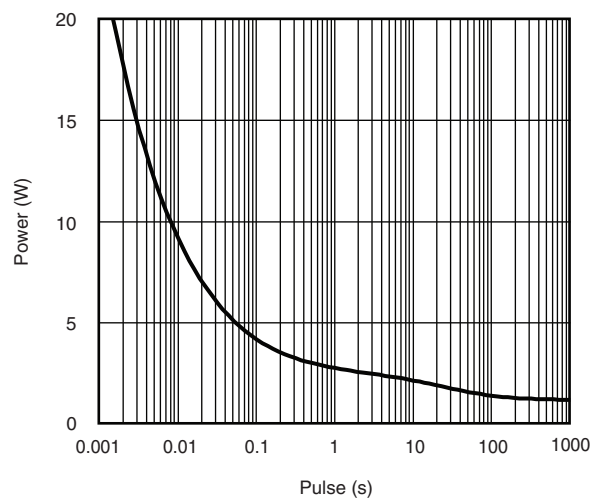
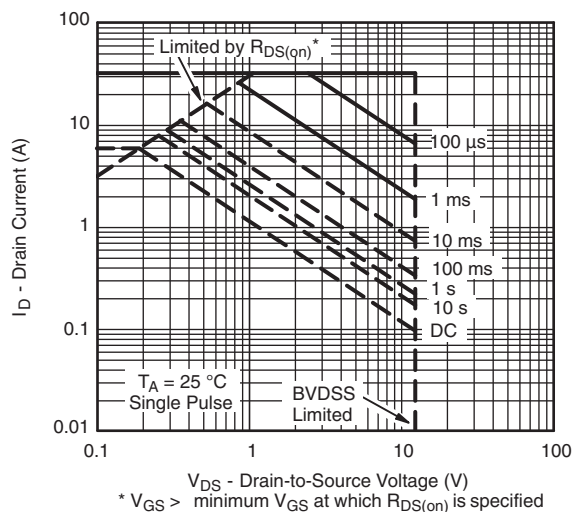
Capacitance



Gate Charge



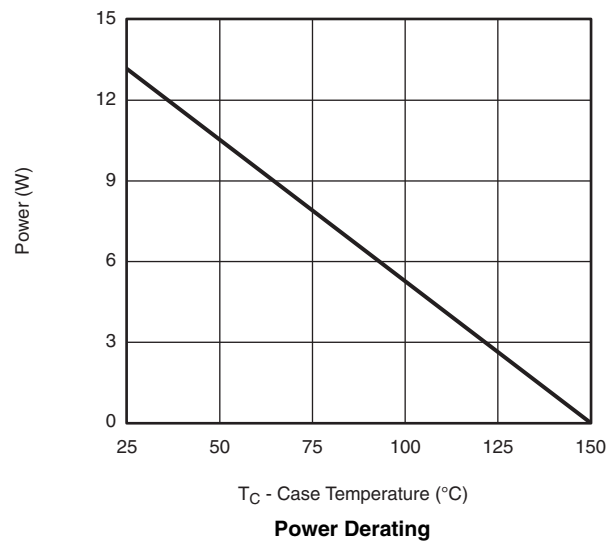
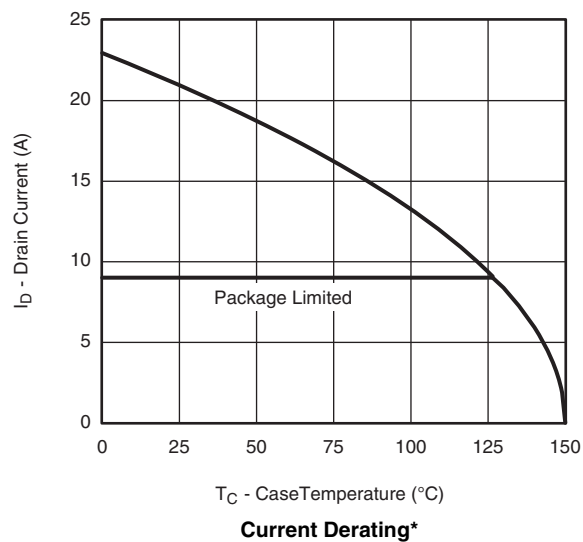
On-Resistance vs. Junction Temperature

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**

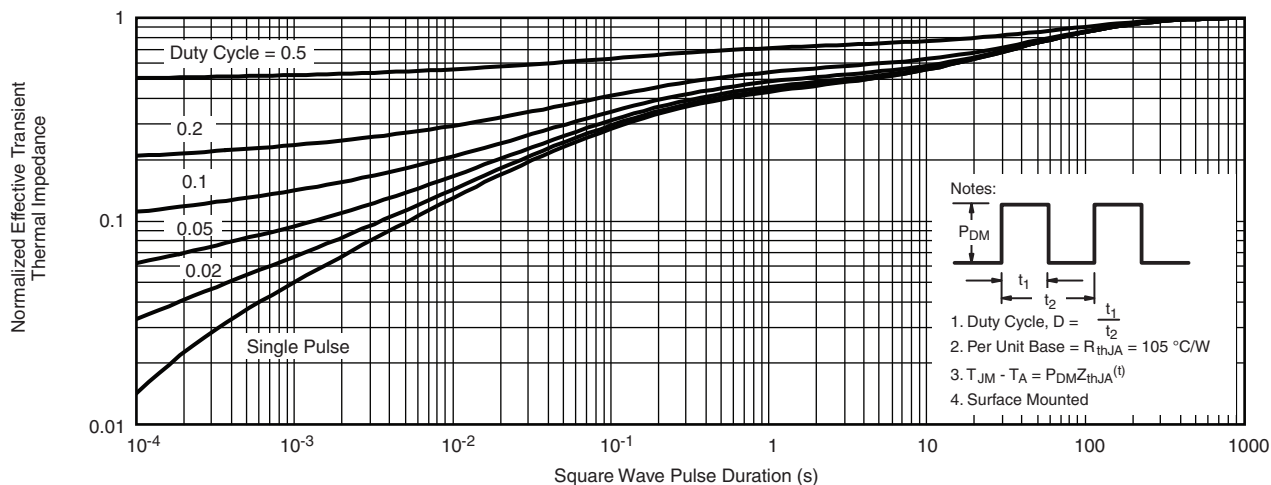
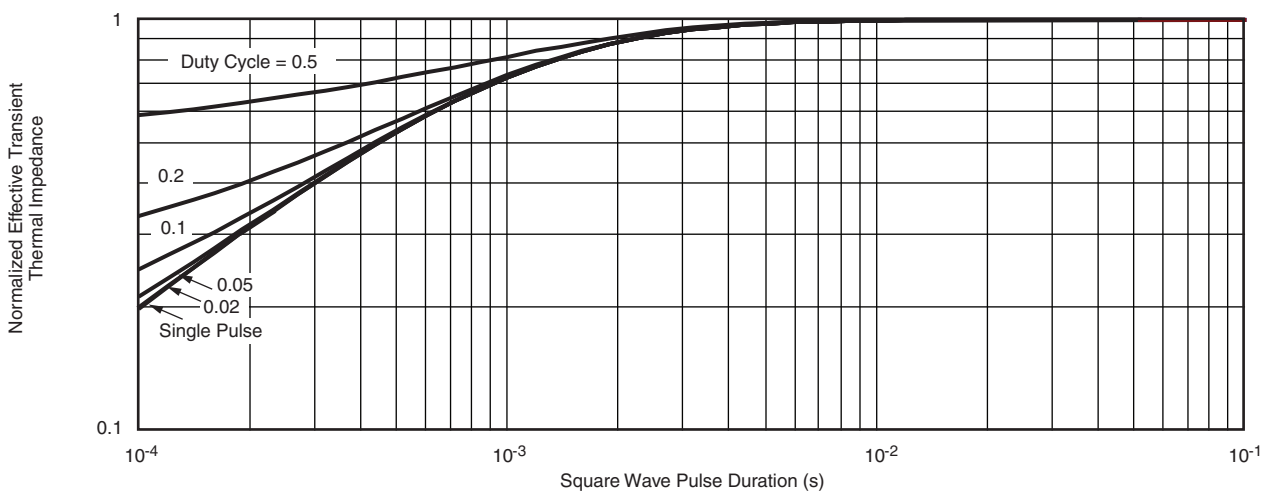
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



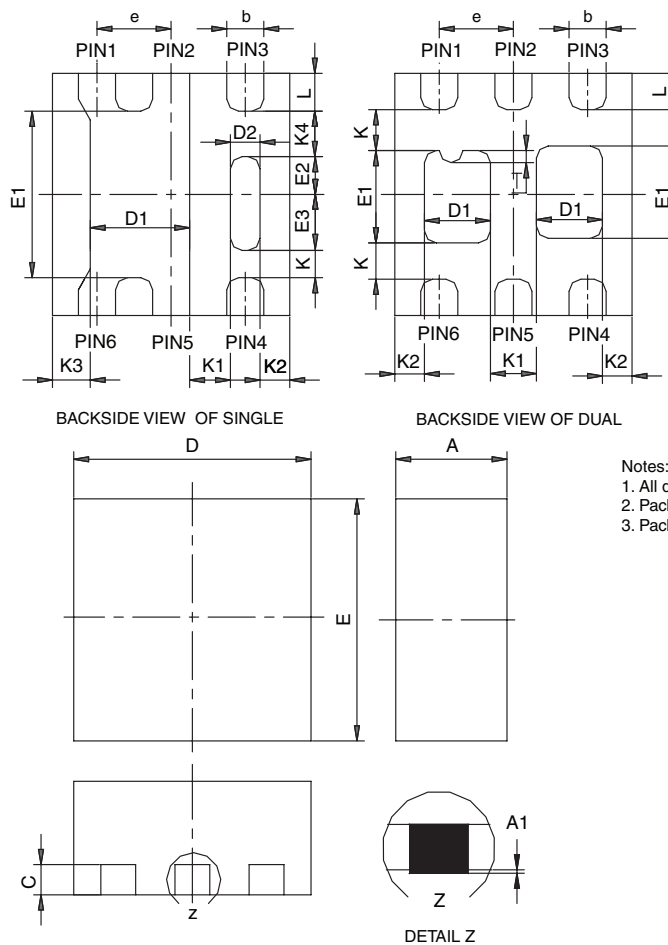
* The power dissipation P_D is based on $T_{J(max)} = 150\text{ °C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Normalized Thermal Transient Impedance, Junction-to-Ambient****Normalized Thermal Transient Impedance, Junction-to-Case**

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PowerPAK® SC75-6L



- Notes:
1. All dimensions are in millimeters
 2. Package outline exclusive of mold flash and metal burr
 3. Package outline inclusive of plating

DIM	SINGLE PAD						DUAL PAD					
	MILLIMETERS			INCHES			MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
A	0.675	0.75	0.80	0.027	0.030	0.032	0.675	0.75	0.80	0.027	0.030	0.032
A1	0	-	0.05	0	-	0.002	0	-	0.05	0	-	0.002
b	0.18	0.25	0.33	0.007	0.010	0.013	0.18	0.25	0.33	0.007	0.010	0.013
C	0.15	0.20	0.25	0.006	0.008	0.010	0.15	0.20	0.25	0.006	0.008	0.010
D	1.53	1.60	1.70	0.060	0.063	0.067	1.53	1.60	1.70	0.060	0.063	0.067
D1	0.57	0.67	0.77	0.022	0.026	0.030	0.34	0.44	0.54	0.013	0.017	0.021
D2	0.10	0.20	0.30	0.004	0.008	0.012						
E	1.53	1.60	1.70	0.060	0.063	0.067	1.53	1.60	1.70	0.060	0.063	0.067
E1	1.00	1.10	1.20	0.039	0.043	0.047	0.51	0.61	0.71	0.020	0.024	0.028
E2	0.20	0.25	0.30	0.008	0.010	0.012						
E3	0.32	0.37	0.42	0.013	0.015	0.017						
e	0.50 BSC			0.020 BSC			0.50 BSC			0.020 BSC		
K	0.180 TYP			0.007 TYP			0.245 TYP			0.010 TYP		
K1	0.275 TYP			0.011 TYP			0.320 TYP			0.013 TYP		
K2	0.200 TYP			0.008 TYP			0.200 BSC			0.008 TYP		
K3	0.255 TYP			0.010 TYP								
K4	0.300 TYP			0.012 TYP								
L	0.15	0.25	0.35	0.006	0.010	0.014	0.15	0.25	0.35	0.006	0.010	0.014
T							0.03	0.08	0.13	0.001	0.003	0.005

ECN: C-07431 – Rev. C, 06-Aug-07
DWG: 5935

Technical drawing of a mechanical part, showing dimensions in mm and inches. The drawing includes a central rectangular feature with a central vertical slot and a horizontal slot. The overall dimensions are 2.000 (0.079) in width and 1.700 (0.067) in height. The central vertical slot is 0.250 (0.01) in width and 0.400 (0.016) in height. The horizontal slot is 0.370 (0.015) in height and 0.620 (0.024) in width. The drawing also shows various other dimensions for the top, bottom, and side features, including a 0.300 (0.012) dimension for the top and bottom features, and a 0.180 (0.007) dimension for the right side feature. A large number '1' is present in the bottom left corner.

Dimensions in mm/(Inches)

APPLICATION NOTE



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