

Dual P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)	Q _g (Typ.)
- 20	0.057 at V _{GS} = - 4.5 V	- 4.5 ^a	4.9 nC
	0.095 at V _{GS} = - 2.5 V	- 4.5 ^a	

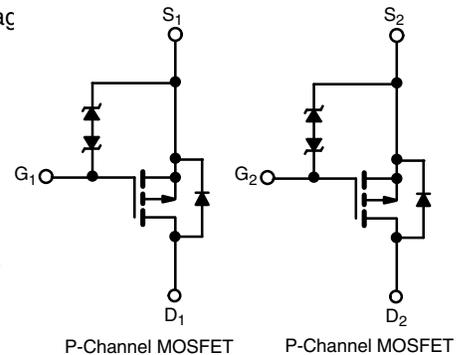
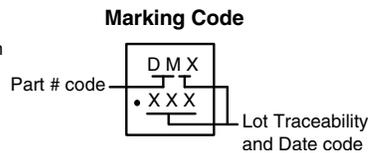
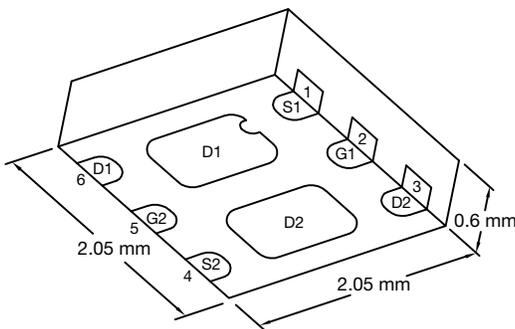
FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- New Thermally Enhanced Thin PowerPAK® SC-70 Package
 - Small Footprint Area
 - Low On-Resistance
- Typical ESD Protection: 1500 V HBM
- High Speed Switching
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

Thin PowerPAK SC-70-6L-Dual



Ordering Information: SiA907EDJT-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	- 20	V
Gate-Source Voltage	V _{GS}	± 12	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	- 4.5 ^a
		T _C = 70 °C	- 4.5 ^a
		T _A = 25 °C	- 4.5 ^{a, b, c}
		T _A = 70 °C	- 3.8 ^{b, c}
Pulsed Drain Current (t = 300 μs)	I _{DM}	- 15	A
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	
		T _A = 25 °C	- 1.6 ^{b, c}
Maximum Power Dissipation	P _D	T _C = 25 °C	7.8
		T _C = 70 °C	5
		T _A = 25 °C	1.9 ^{b, c}
		T _A = 70 °C	1.2 ^{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}	t ≤ 5 s	R _{thJA}	52	65	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R _{thJC}	12.5	16	

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- See solder profile (www.vishay.com/ppg?73257). The Thin PowerPAK SC-70 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 110 °C/W.

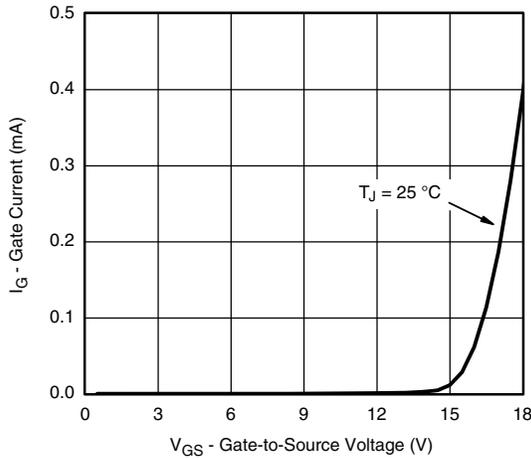
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-14		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			2.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.5		-1.4	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$			± 0.5	μA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 10	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			-1	
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	-15			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -3.6\text{ A}$		0.047	0.057	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -1.5\text{ A}$		0.075	0.095	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -3.6\text{ A}$		11		S
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}, V_{GS} = -10\text{ V}, I_D = -4.7\text{ A}$		15	23	nC
				7.1	11	
				1.3		
Gate-Source Charge	Q_{gs}	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -4.7\text{ A}$		2.1		
Gate-Drain Charge	Q_{gd}					
Gate Resistance	R_g	$f = 1\text{ MHz}$	1.4	7	14	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 2.7\text{ }\Omega$ $I_D = -3.7\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		13	25	ns
Rise Time	t_r			15	30	
Turn-Off Delay Time	$t_{d(off)}$			30	60	
Fall Time	t_f			10	15	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 2.7\text{ }\Omega$ $I_D = -3.7\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		5	10	
Rise Time	t_r			10	20	
Turn-Off Delay Time	$t_{d(off)}$			30	60	
Fall Time	t_f			10	20	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-4.5	A
Pulse Diode Forward Current	I_{SM}				-15	
Body Diode Voltage	V_{SD}	$I_S = -3.7\text{ A}, V_{GS} = 0\text{ V}$		-0.9	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -3.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		15	30	ns
Body Diode Reverse Recovery Charge	Q_{rr}			6	12	nC
Reverse Recovery Fall Time	t_a			8.5		ns
Reverse Recovery Rise Time	t_b			6.5		

Notes:

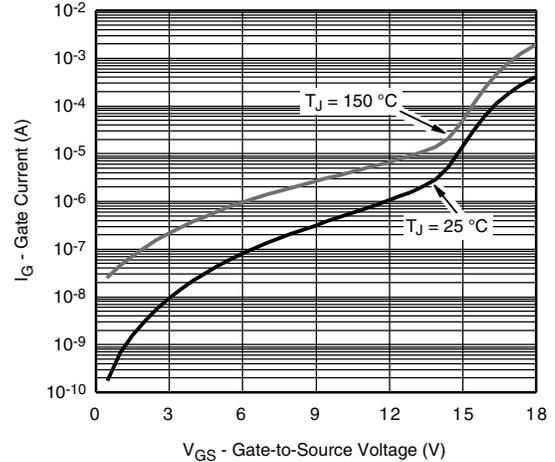
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

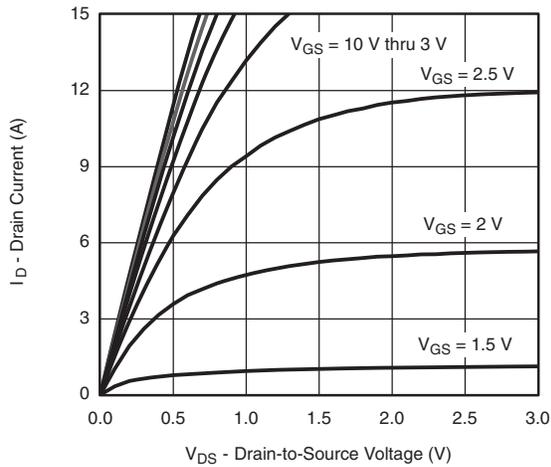
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



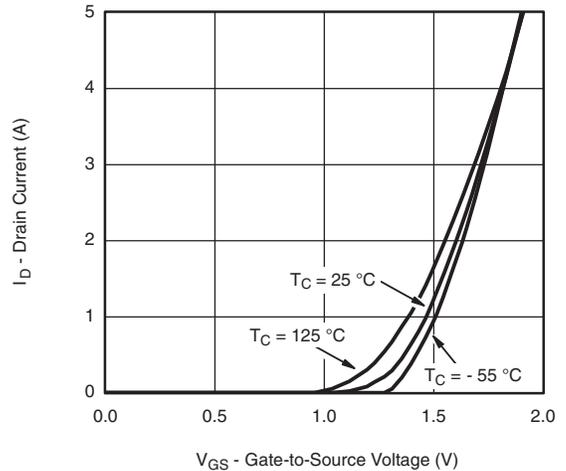
Gate Current vs. Gate-to-Source Voltage



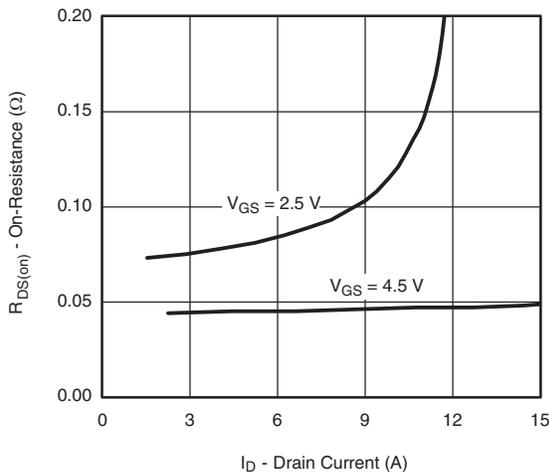
Gate Current vs. Gate-to-Source Voltage



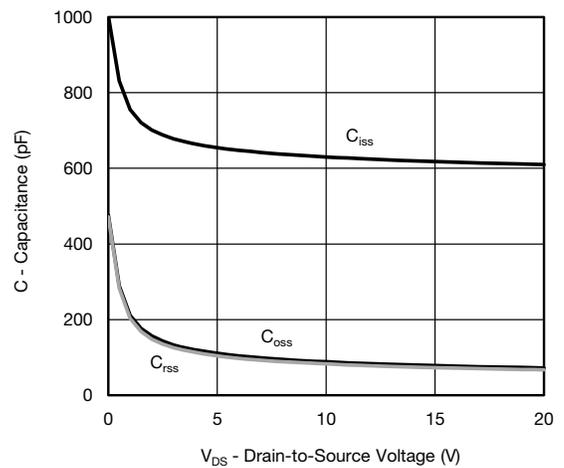
Output Characteristics



Transfer Characteristics

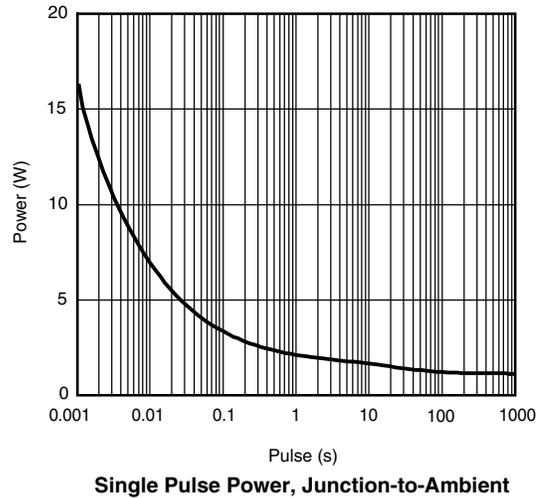
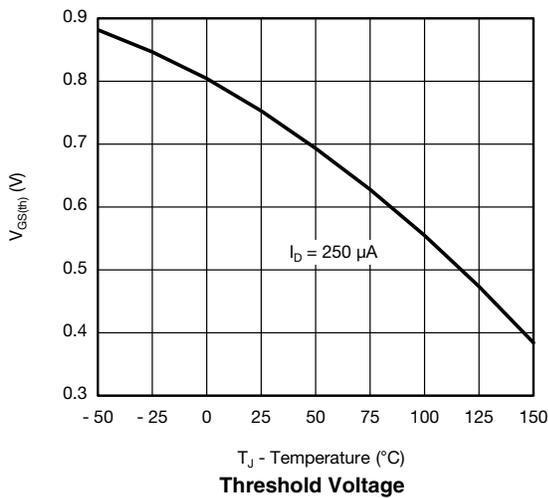
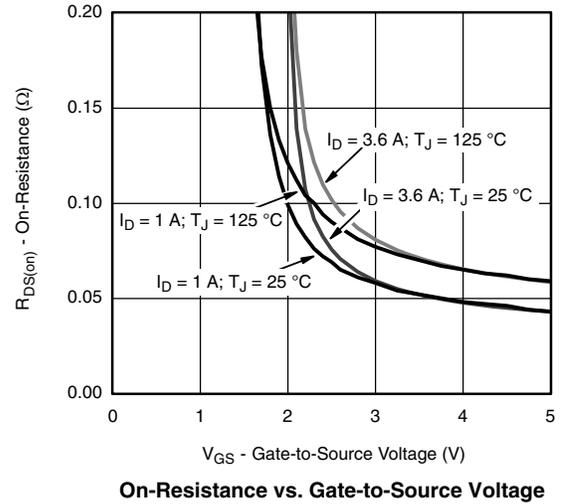
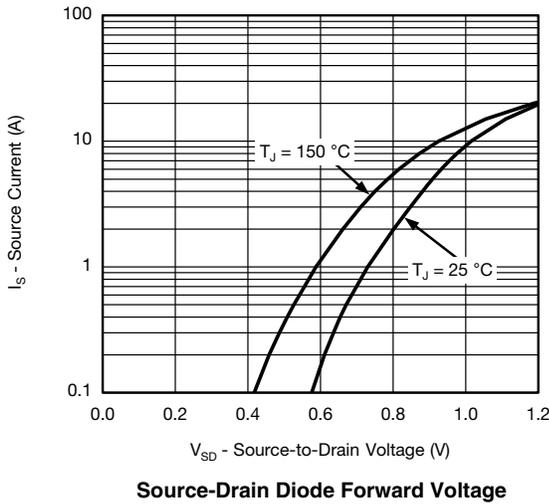
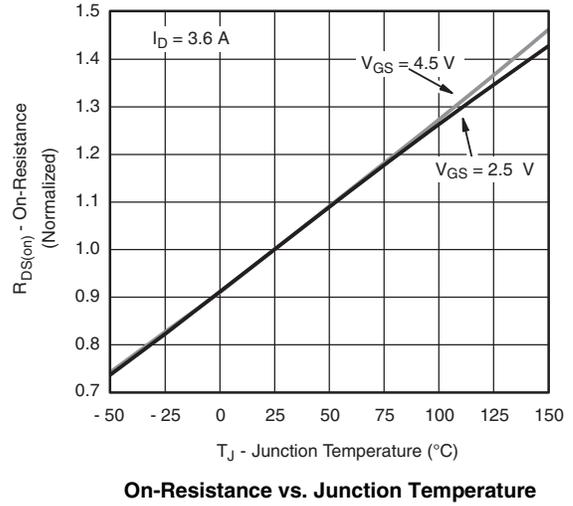
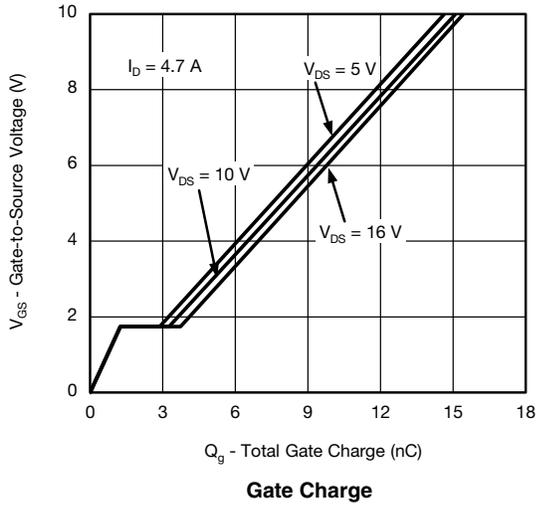


On-Resistance vs. Drain Current and Gate Voltage

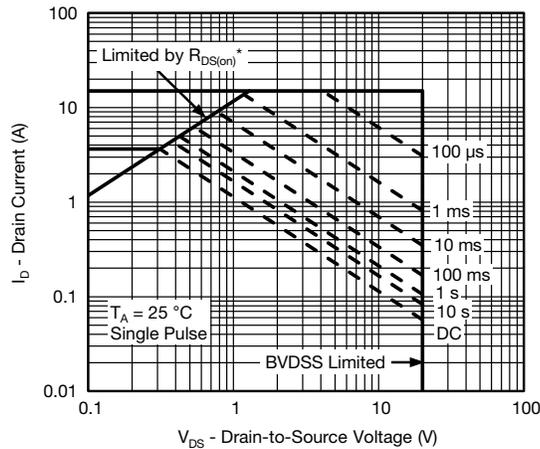


Capacitance

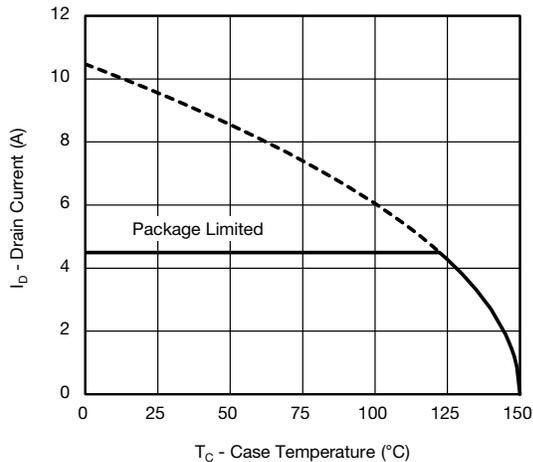
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



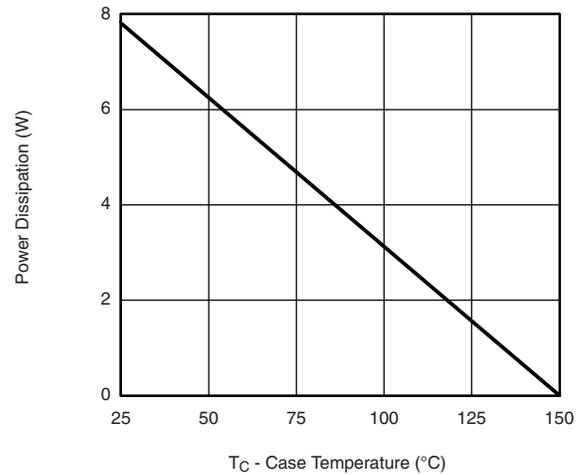
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Safe Operating Area, Junction-to-Ambient



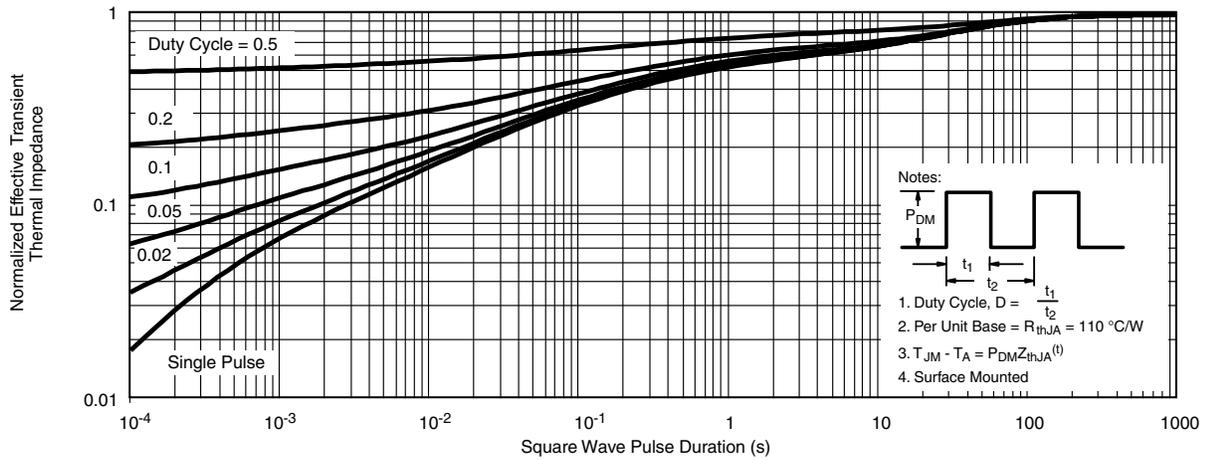
Current Derating*



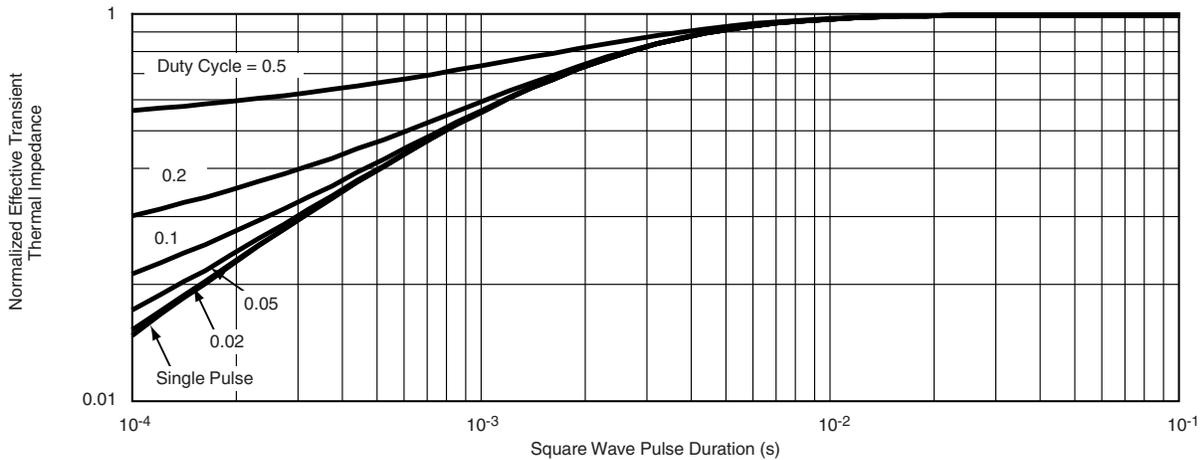
Power Derating

* 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)



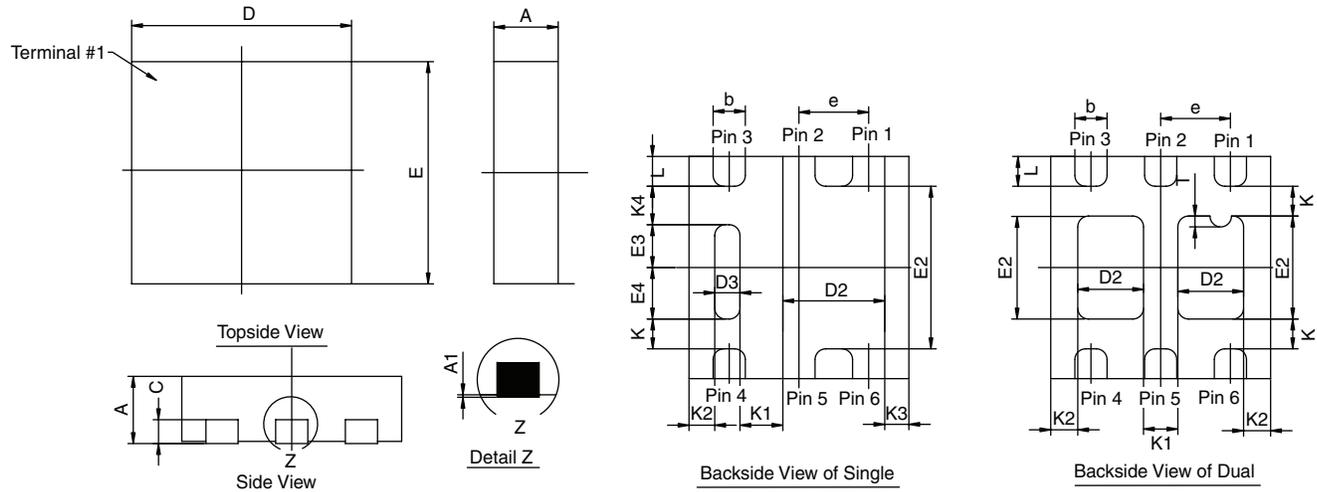
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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CASE OUTLINE for PowerPAK® SC70T



DIM.	SINGLE PAD						DUAL PAD					
	MILLIMETERS			INCHES			MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.525	0.60	0.65	0.0206	0.024	0.026	0.525	0.60	0.65	0.0206	0.024	0.026
A1	0.00	-	0.05	0.00	-	0.002	0.00	-	0.05	0.00	-	0.002
b	0.23	0.30	0.38	0.009	0.012	0.015	0.23	0.30	0.38	0.009	0.012	0.015
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	1.98	2.05	2.15	0.078	0.081	0.085	1.98	2.05	2.15	0.078	0.081	0.085
D2	0.85	0.95	1.05	0.033	0.037	0.041	0.513	0.613	0.713	0.020	0.024	0.028
D3	0.135	0.235	0.335	0.005	0.009	0.013						
E	1.98	2.05	2.15	0.078	0.081	0.085	1.98	2.05	2.15	0.078	0.081	0.085
E2	1.40	1.50	1.60	0.055	0.059	0.063	0.85	0.95	1.05	0.033	0.037	0.041
E3	0.345	0.395	0.445	0.014	0.016	0.018						
E4	0.425	0.475	0.525	0.017	0.019	0.021						
e	0.65 BSC			0.026 BSC			0.65 BSC			0.026 BSC		
K	0.275 TYP.			0.011 TYP.			0.275 TYP.			0.011 TYP.		
K1	0.400 TYP.			0.016 TYP.			0.320 TYP.			0.013 TYP.		
K2	0.240 TYP.			0.009 TYP.			0.252 TYP.			0.010 TYP.		
K3	0.225 TYP.			0.009 TYP.								
K4	0.355 TYP.			0.014 TYP.								
L	0.175	0.275	0.375	0.007	0.011	0.015	0.175	0.275	0.375	0.007	0.011	0.015
T							0.05	0.10	0.15	0.002	0.004	0.006

ECN: C09-0671-Rev. A, 07-Sep-09
DWG: 5994

Notes

1. All dimensions are in millimeter. Millimeters will govern.
2. Package outline exclusive of mold flash and metal burr.
3. Package outline inclusive of plating



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