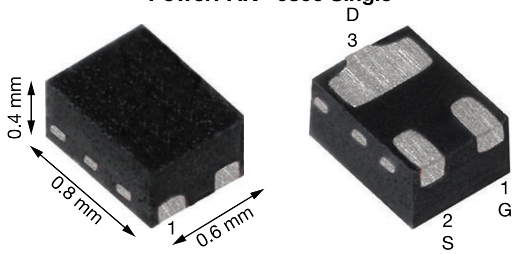
N-Channel 20 V (D-S) MOSFET

PowerPAK® 0806 Single



Top View Bottom View

Marking Code: C

PRODUCT SUMMARY	
V_{DS} (V)	20
$R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.73
$R_{DS(on)}$ max. (Ω) at V_{GS} = 2.5 V	0.87
$R_{DS(on)}$ max. (Ω) at V_{GS} = 1.8 V	1.10
$R_{DS(on)}$ max. (Ω) at V_{GS} = 1.5 V	1.80
Q_g typ. (nC)	0.5
I_D (A) [a]	1
Configuration	Single

FEATURES

- TrenchFET® power MOSFET
- Ultra small 0.8 mm x 0.6 mm outline
- Ultra thin 0.4 mm max. height
- 100 % R_g tested
- Typical ESD protection 2000 V (HBM)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

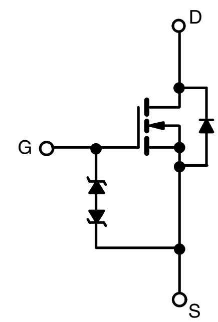
Pb-free

RoHS COMPLIANT

HALOGEN FREE

APPLICATIONS

- Load switch
- High speed switching
- DC/DC converters
- For smart phones, tablet PCs and mobile computing
- Small signal switching



N-Channel MOSFET

ORDERING INFORMATION	
Package	PowerPAK 0806
Lead (Pb)-free and halogen-free	SiUD402ED-T1-GE3

Note

- The lead finish is NiPdAu and classed as E4 finish

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}	± 8	
Continuous drain current (T_J = 150 °C)	T_A = 25 °C	I_D	1 [a]	A
	T_A = 70 °C		0.8 [a]	
	T_A = 25 °C		0.35 [b]	
	T_A = 70 °C		0.28 [b]	
Pulsed drain current (t = 100 μs)		I_{DM}	1.4	
Continuous source-drain diode current	T_A = 25 °C	I_S	1 [a]	
	T_A = 25 °C		0.37 [b]	
Maximum power dissipation	T_A = 25 °C	P_D	1.25 [a]	W
	T_A = 70 °C		0.8 [a]	
	T_A = 25 °C		0.37 [b]	
	T_A = 70 °C		0.24 [b]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) [c]			260	

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum junction-to-ambient [a, d]	t ≤ 5 s	R_{thJA}	80	100	°C/W
Maximum junction-to-ambient [b, e]			265	335	

Notes

a. Surface mounted on 1" x 1" FR4 board with full copper, t = 5 s
b. Surface mounted on 1" x 1" FR4 board with minimum copper, t = 5 s
c. Refer to IPC/JEDEC® (J-STD-020), no manual or hand soldering
d. Maximum under steady state conditions is 135 °C/W
e. Maximum under steady state conditions is 400 °C/W

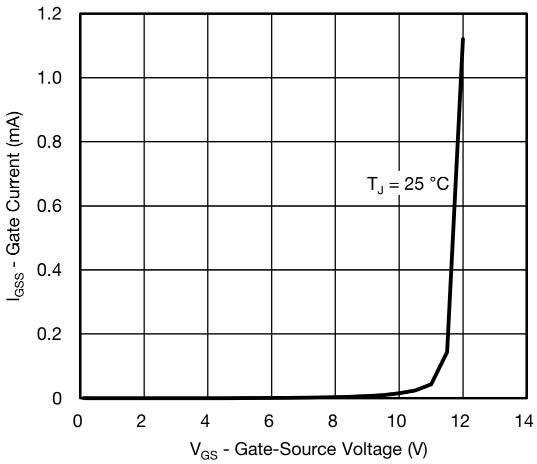
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	20	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	I_D = 250 μA	-	18	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	-1.9	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250 μA	0.4	-	0.9	V
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 4.5 V	-	-	± 0.5	μA
		V_{DS} = 0 V, V_{GS} = ± 8 V	-	-	± 10	
Zero gate voltage drain current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V	-	-	1	
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 55 °C	-	-	10	
On-state drain current [a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 4.5 V	1	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 0.2 A	-	0.57	0.73	Ω
		V_{GS} = 2.5 V, I_D = 0.1 A	-	0.67	0.87	
		V_{GS} = 1.8 V, I_D = 0.02 A	-	0.80	1.10	
		V_{GS} = 1.5 V, I_D = 0.01 A	-	0.90	1.80	
Forward transconductance [a]	g_{fs}	V_{DS} = 10 V, I_D = 0.2 A	-	1.2	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	-	16	-	pF
Output capacitance	C_{oss}		-	7.5	-	
Reverse transfer capacitance	C_{rss}		-	3.5	-	
Total gate charge	Q_g	V_{DS} = 10 V, V_{GS} = 8 V, I_D = 0.2 A	-	0.75	1.20	nC
		V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 0.2 A	-	0.50	0.75	
Gate-source charge	Q_{gs}		-	0.09	-	
Gate-drain charge	Q_{gd}		-	0.09	-	
Gate resistance	R_g	f = 1 MHz	3	24	50	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 50 Ω $I_D \cong$ 0.2 A, V_{GEN} = 4.5 V, Rg = 1 Ω	-	7	15	ns
Rise time	t_r		-	10	20	
Turn-off delay time	$t_{d(off)}$		-	23	50	
Fall time	t_f		-	7	15	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 15 Ω $I_D \cong$ 0.2 A, V_{GEN} = 8 V, R_g = 1 Ω	-	5	10	
Rise time	t_r		-	5	10	
Turn-off delay time	$t_{d(off)}$		-	11	25	
Fall time	t_f		-	5	10	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	T_C = 25 °C	-	-	1 [c]	A
Pulse diode forward current	I_{SM}		-	-	1.4	
Body diode voltage	V_{SD}	I_S = 0.2 A, V_{GS} = 0 V	-	0.8	1.2	V
Body diode reverse recovery time	t_{rr}	I_F = 0.2 A, dI/dt = 100 A/μs, T_J = 25 °C	-	11	25	ns
Body diode reverse recovery charge	Q_{rr}		-	3.5	7	nC
Reverse recovery fall time	t_a		-	5.3	-	ns
Reverse recovery rise time	t_b		-	5.7	-	

Note

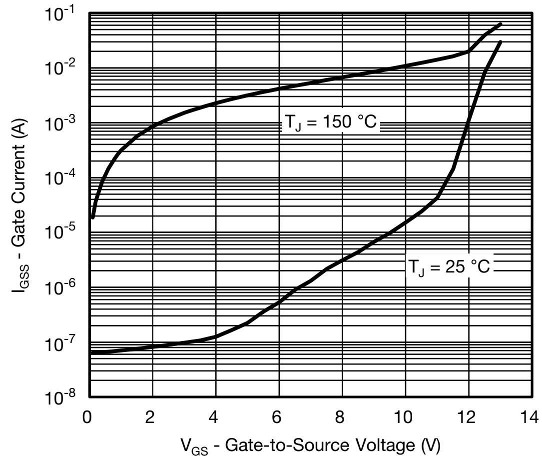
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Surface mounted on 1" x 1" FR4 board with full copper, t = 5 s

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.

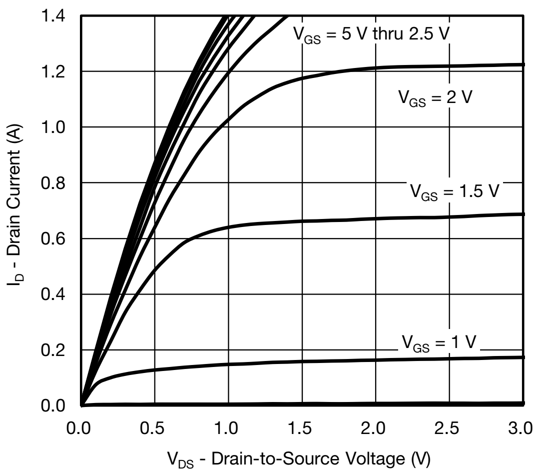
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



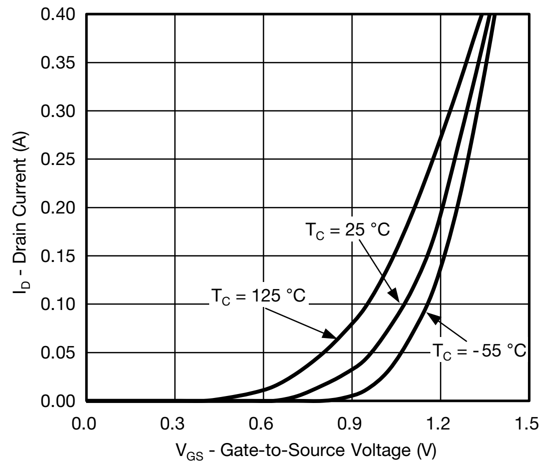
Gate Current vs. Gate-Source Voltage



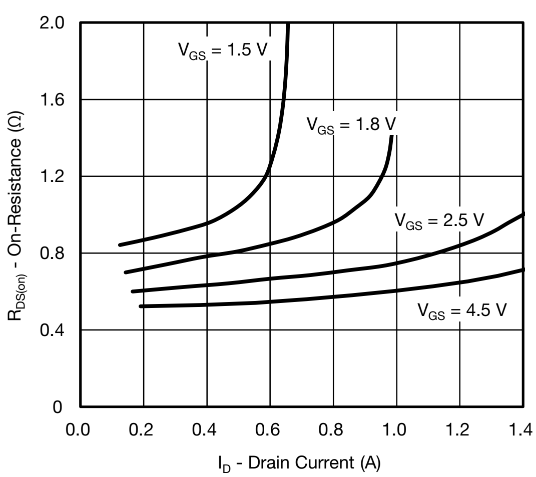
Gate Current vs. Gate-Source Voltage



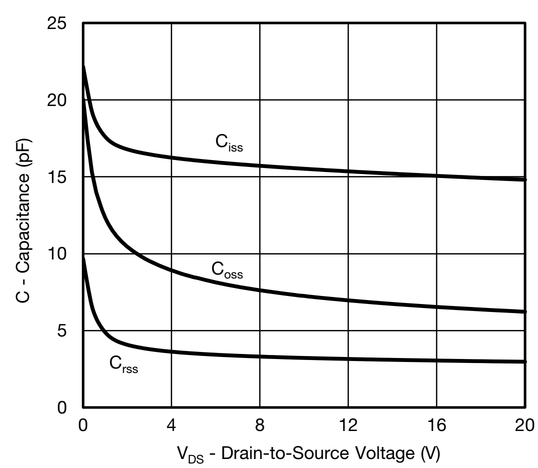
Output Characteristics



Transfer Characteristics

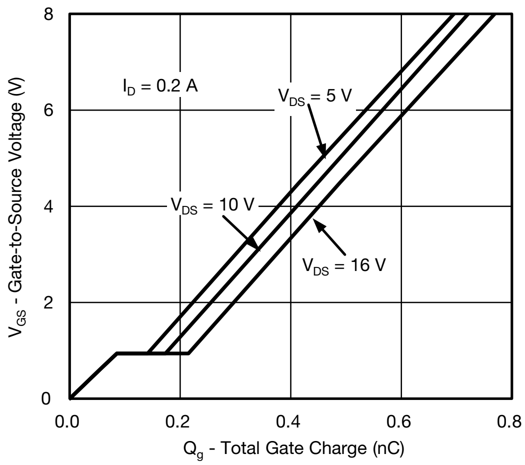


On-Resistance vs. Drain Current

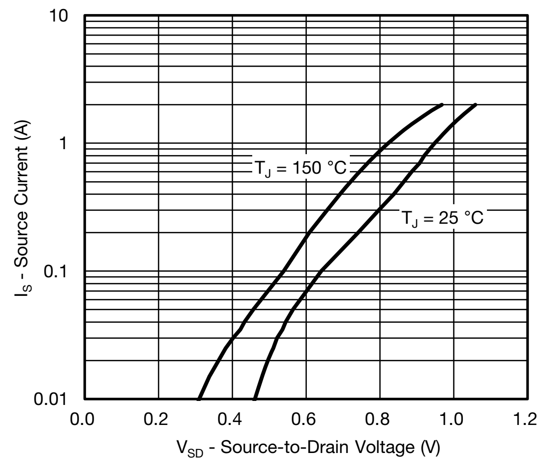


Capacitance vs. Drain-to-Source Voltage

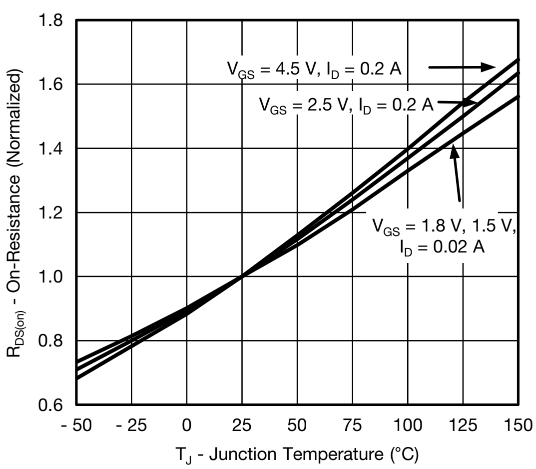
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



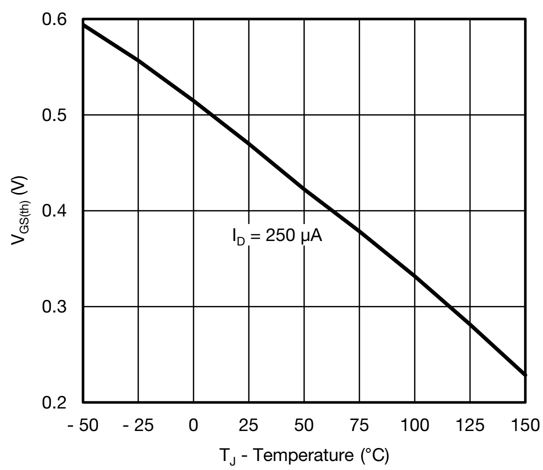
Gate Charge



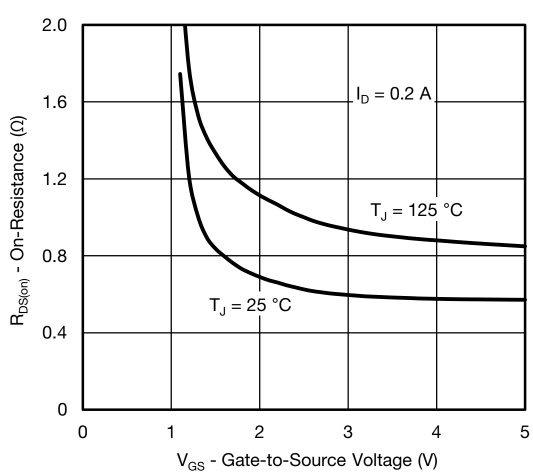
Source-Drain Diode Forward Voltage



On-Resistance vs. Junction Temperature

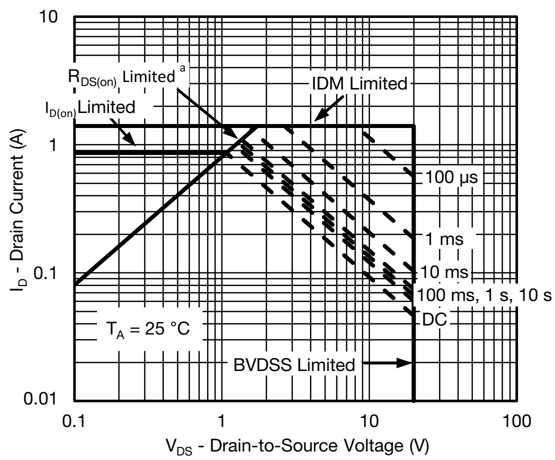


Threshold Voltage

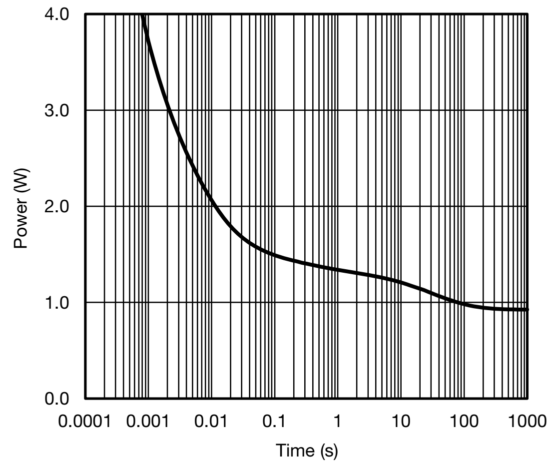


On-Resistance vs. Gate-to-Source Voltage

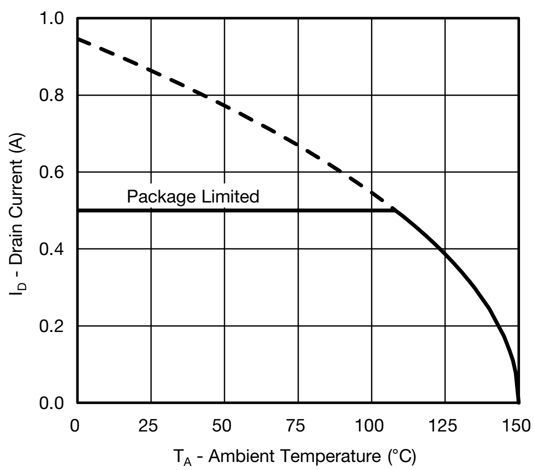
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



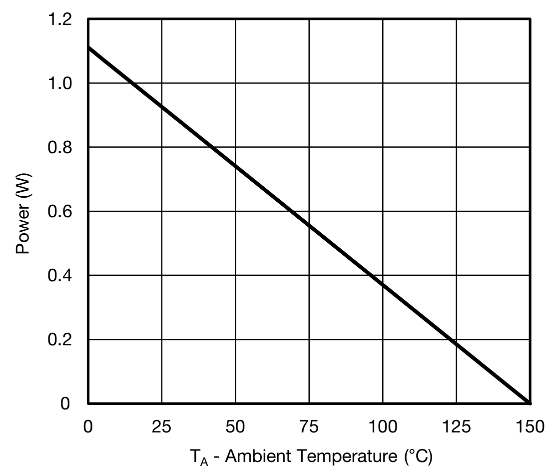
Safe Operating Area (Junction-to-Ambient) [b]



Single Pulse Power, Junction-to-Ambient [b]



Current Derating [b, c]



Power Derating [b]

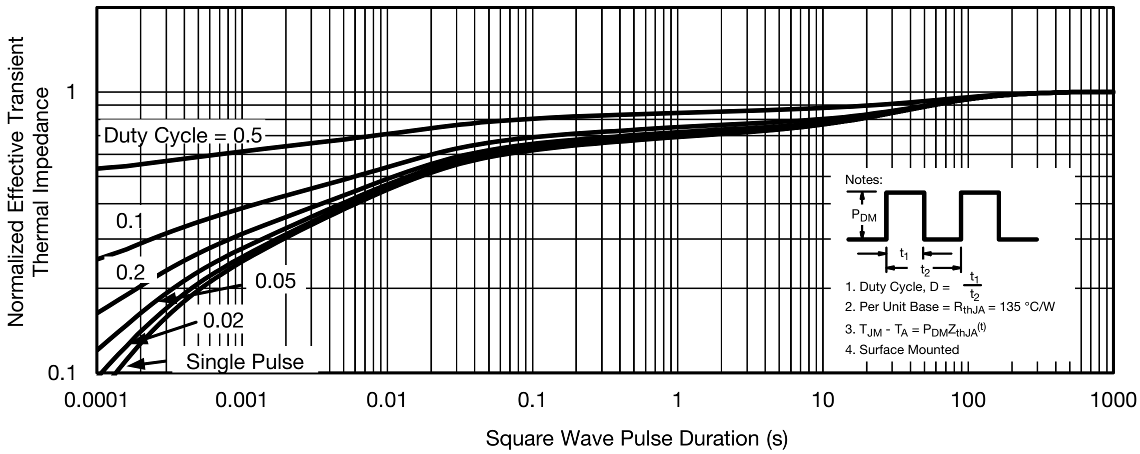
Note

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

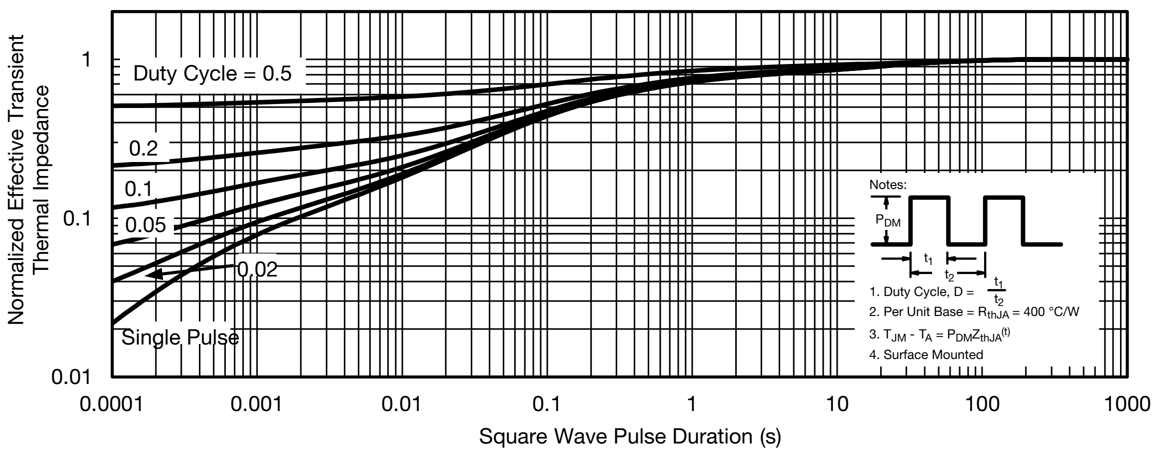
b. When mounted on 1" x 1" FR4 with full copper

c. The power dissipation P_D is based on T_J (max.) = 150 °C, using junction-to-ambient 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 [a]

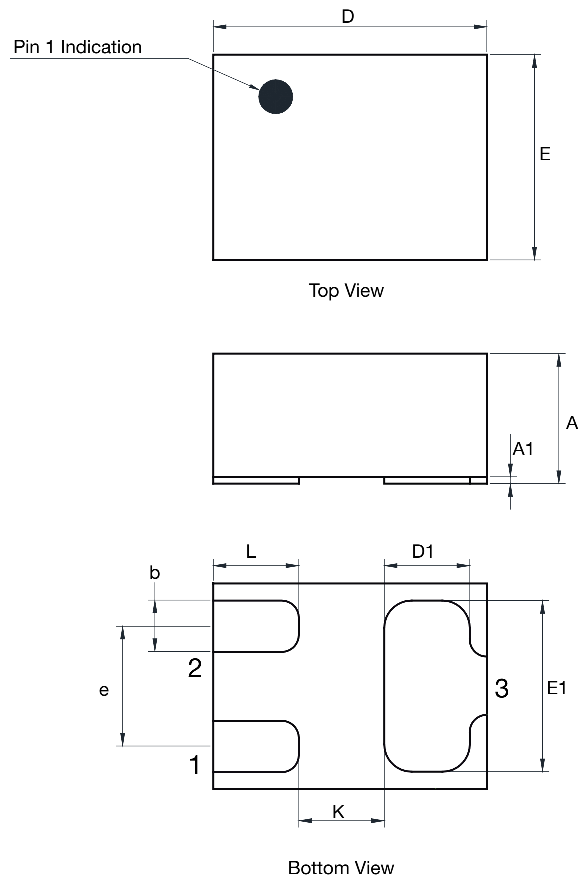


Normalized Thermal Transient Impedance, Junction-to-Ambient [a]

Note

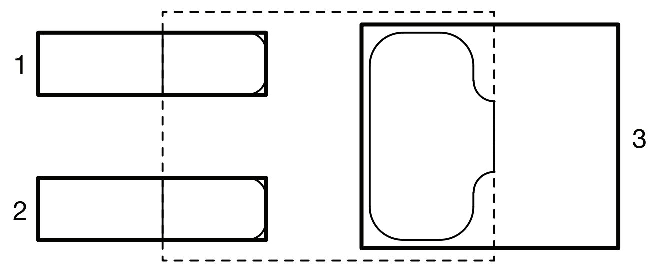
a. When mounted on 1" x 1" FR4 with minimum copper

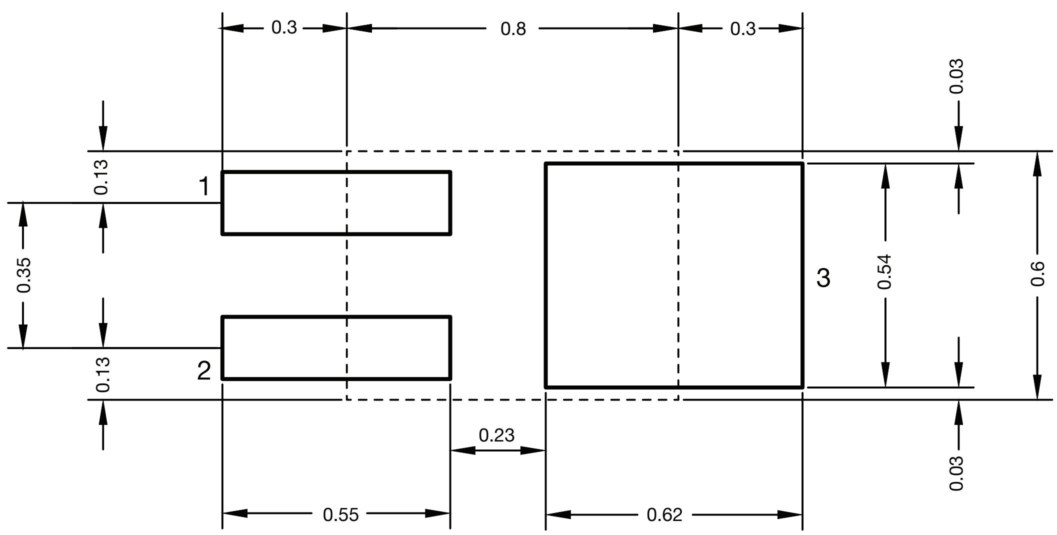
Case Outline for PowerPAK 0.8 mm x 0.6 mm



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.350	0.380	0.400	0.0138	0.0150	0.0157
A1	0	-	0.020	0	-	0.0008
b	0.120	0.150	0.180	0.0047	0.0059	0.0071
C	0.119	0.127	0.135	0.0047	0.0050	0.0053
D	0.750	0.800	0.850	0.0295	0.0315	0.0335
D1	0.200	0.250	0.300	0.0078	0.0098	0.0118
E	0.550	0.600	0.650	0.0217	0.0236	0.0256
E1	0.450	0.500	0.550	0.0177	0.0197	0.0217
e	0.300	0.350	0.400	0.0118	0.0138	0.0158
K	0.150	0.250	0.350	0.0058	0.0098	0.0138
L	0.200	0.250	0.300	0.0078	0.0098	0.0118
ECN: C13-1574-Rev. A, 23-Dec-13 DWG: 6020						

Recommended Land Pattern PowerPAK® 0806





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