



P-Channel 20-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g
- 20	0.094 at V _{GS} = - 4.5 V	- 4.5	4.9 nC
	0.131 at V _{GS} = - 2.5 V	- 4.5	
	0.185 at V _{GS} = - 1.8 V	- 4.5	

SCHOTTKY PRODUCT SUMMARY		
V _{KA} (V)	V _f (V) Diode Forward Voltage	I _F (A) ^a
20	0.46 at 0.5 A	1

FEATURES

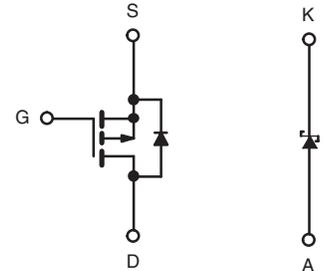
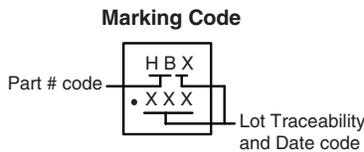
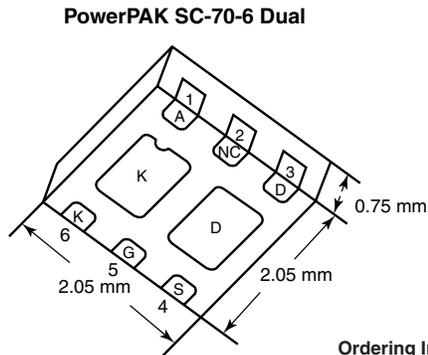
- Halogen-free According to IEC 61249-2-21 Definition
- LITTLE FOOT[®] Plus Schottky Power MOSFET
- New Thermally Enhanced PowerPAK[®] SC-70 Package
 - Small Footprint Area
 - Low On-Resistance
 - Thin 0.75 mm Profile
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Cellular Charger Switch
- Buck Converter for Portable Devices
- Load Switch for Portable Devices



Ordering Information: SiA813DJ-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage (MOSFET)	V _{DS}	- 20	V	
Reverse Voltage (Schottky)	V _{KA}	20		
Gate-Source Voltage (MOSFET)	V _{GS}	± 8		
Continuous Drain Current (T _J = 150 °C) (MOSFET)	I _D	T _C = 25 °C	- 4.5 ^a	A
		T _C = 70 °C	- 4.5 ^a	
		T _A = 25 °C	- 3.6 ^{b, c}	
		T _A = 70 °C	- 2.9 ^{b, c}	
Pulsed Drain Current (MOSFET)	I _{DM}	- 8		
Continuous Source-Drain Diode Current (MOSFET Diode Conduction)	I _S	T _C = 25 °C	- 4.5 ^a	
		T _A = 25 °C	- 1.6 ^{b, c}	
Average Forward Current (Schottky)	I _F	1 ^b		
Pulsed Forward Current (Schottky)	I _{FM}	2		
Maximum Power Dissipation (MOSFET)	P _D	T _C = 25 °C	6.5	W
		T _C = 70 °C	5	
		T _A = 25 °C	1.9 ^{b, c}	
		T _A = 70 °C	1.2 ^{b, c}	
Maximum Power Dissipation (Schottky)	P _D	T _C = 25 °C	7.3	
		T _C = 70 °C	4.7	
		T _A = 25 °C	2.3 ^{b, c}	
		T _A = 70 °C	1.5 ^{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 (MOSFET) ^{b, f}	$t \leq 5$ s	R_{thJA}	52	65	°C/W
Maximum Junction-to-Case (Drain) (MOSFET)	Steady State	R_{thJC}	12.5	16	
Maximum Junction-to-Ambient (Schottky) ^{b, g}	$t \leq 5$ s	R_{thJA}	40	55	
Maximum Junction-to-Case (Drain) (Schottky)	Steady State	R_{thJC}	13	17	

Notes:

- a. Package limited.
 b. Surface mounted on 1" x 1" FR4 board.
 c. $t = 5$ s.
 d. See solder profile (www.vishay.com/ppg?73257). The 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.
 e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
 f. Maximum under steady state conditions for MOSFET is 110 °C/W.
 g. Maximum under steady state conditions for Schottky is 85 °C.

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, $I_D = -250$ μ A	-20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250$ μ A		-16.2		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		2.1			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250$ μ A	-0.4		-1	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 8$ V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20$ V, $V_{GS} = 0$ V			-1	μ A
		$V_{DS} = -20$ V, $V_{GS} = 0$ V, $T_J = 55$ °C			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5$ V, $V_{GS} = -4.5$ V	-8			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5$ V, $I_D = -2.8$ A		0.078	0.094	Ω
		$V_{GS} = -2.5$ V, $I_D = -2.3$ A		0.109	0.131	
		$V_{GS} = -1.8$ V, $I_D = -0.54$ A		0.153	0.185	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10$ V, $I_D = -2.8$ A		7		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -10$ V, $V_{GS} = 0$ V, $f = 1$ MHz		355		pF
Output Capacitance	C_{oss}		75			
Reverse Transfer Capacitance	C_{rss}		50			
Total Gate Charge	Q_g	$V_{DS} = -10$ V, $V_{GS} = -8$ V, $I_D = -4.5$ A		8.5	13	nC
				4.9	7.4	
Gate-Source Charge	Q_{gs}	$V_{DS} = -10$ V, $V_{GS} = -4.5$ V, $I_D = -4.5$ A		0.75		nC
Gate-Drain Charge	Q_{gd}		1.2			
Gate Resistance	R_g		$f = 1$ MHz		8	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10$ V, $R_L = 2.2$ Ω $I_D \cong -4.5$ A, $V_{GEN} = -4.5$ V, $R_g = 1$ Ω		10	15	ns
Rise Time	t_r		35	55		
Turn-Off Delay Time	$t_{d(off)}$		40	60		
Fall Time	t_f		50	75		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10$ V, $R_L = 2.2$ Ω $I_D \cong -4.5$ A, $V_{GEN} = -8$ V, $R_g = 1$ Ω		5	10	ns
Rise Time	t_r		10	15		
Turn-Off Delay Time	$t_{d(off)}$		20	30		
Fall Time	t_f		10	15		



SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
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}				- 8	
Body Diode Voltage	V_{SD}	$I_S = - 4.5\text{ A}, V_{GS} = 0\text{ V}$		- 0.85	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = - 4.5\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		30	60	ns
Body Diode Reverse Recovery Charge	Q_{rr}			13	26	nC
Reverse Recovery Fall Time	t_a			10		ns
Reverse Recovery Rise Time	t_b			15		

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.

SCHOTTKY SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$I_F = 0.5\text{ A}$		0.381	0.46	V
		$I_F = 1\text{ A}$		0.468	0.560	
		$I_F = 1\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.44	0.53	
Maximum Reverse Leakage Current	I_{rm}	$V_r = 5\text{ V}$		0.0081	0.041	mA
		$V_r = 5\text{ V}, T_J = 85\text{ }^\circ\text{C}$		0.4	4	
		$V_r = 5\text{ V}, T_J = 125\text{ }^\circ\text{C}$		2.8	28	
		$V_r = 10\text{ V}$		0.0085	0.043	
		$V_r = 10\text{ V}, T_J = 85\text{ }^\circ\text{C}$		0.5	5	
		$V_r = 10\text{ V}, T_J = 125\text{ }^\circ\text{C}$		3	30	
		$V_r = 20\text{ V}$		0.0093	0.047	
		$V_r = 20\text{ V}, T_J = 85\text{ }^\circ\text{C}$		0.5	5	
		$V_r = 20\text{ V}, T_J = 125\text{ }^\circ\text{C}$		3.2	32	
Junction Capacitance	C_T	$V_r = 10\text{ V}$		30		pF

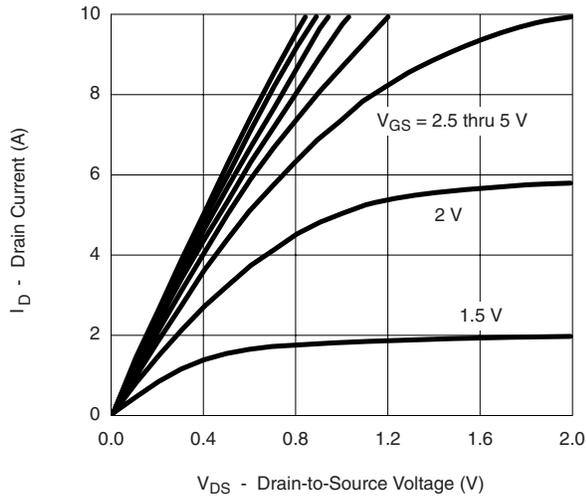
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

SiA813DJ

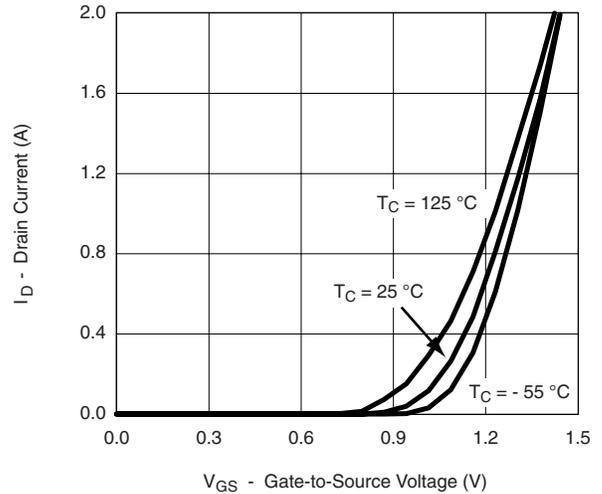
Vishay Siliconix



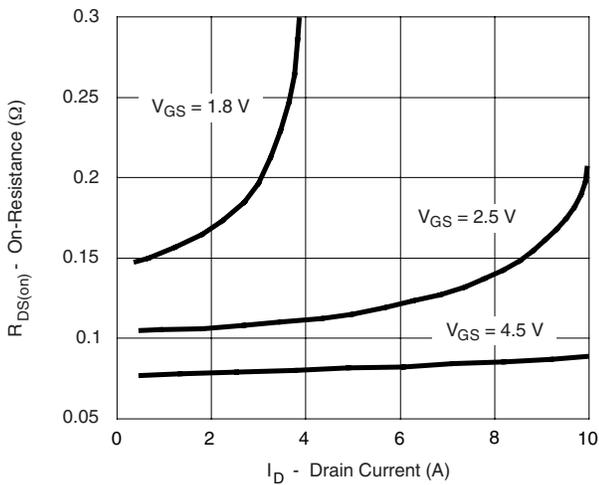
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



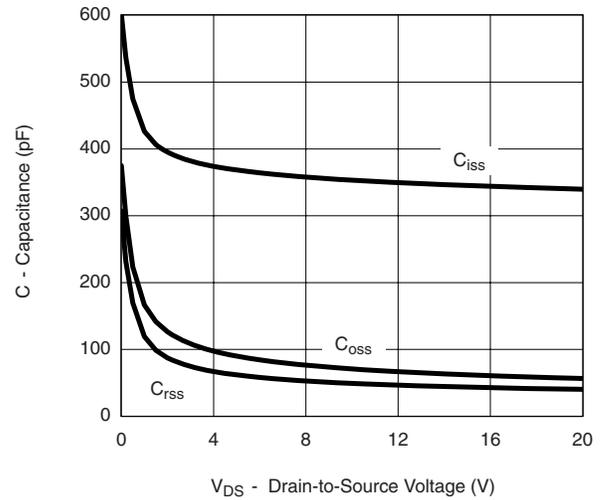
Output Characteristics



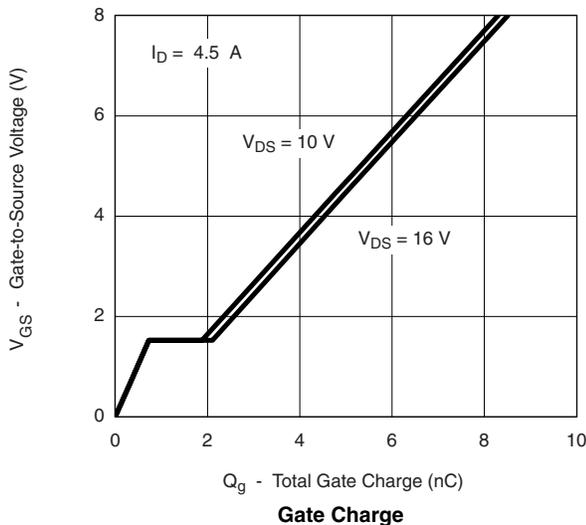
Transfer Characteristics



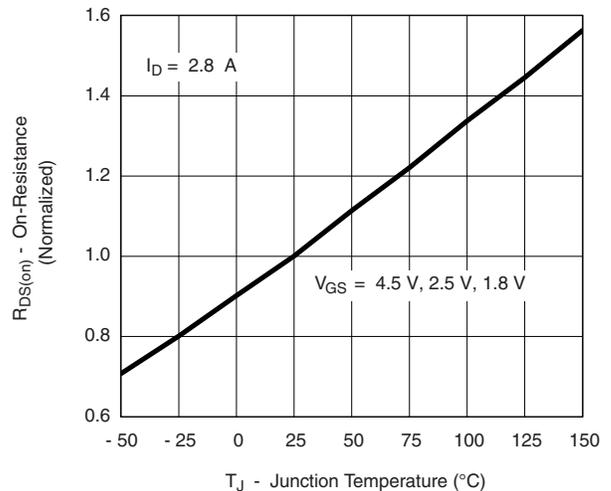
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



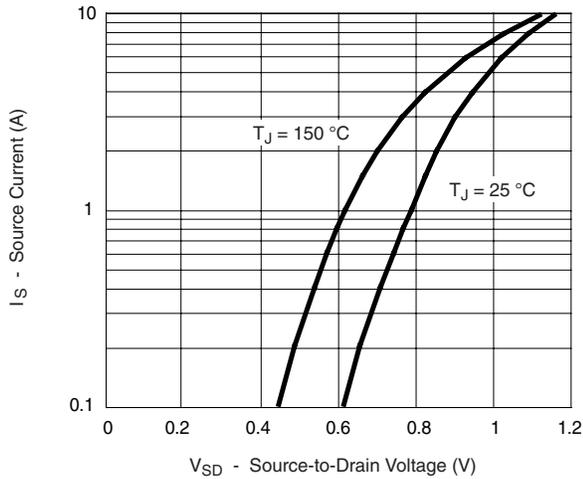
Gate Charge



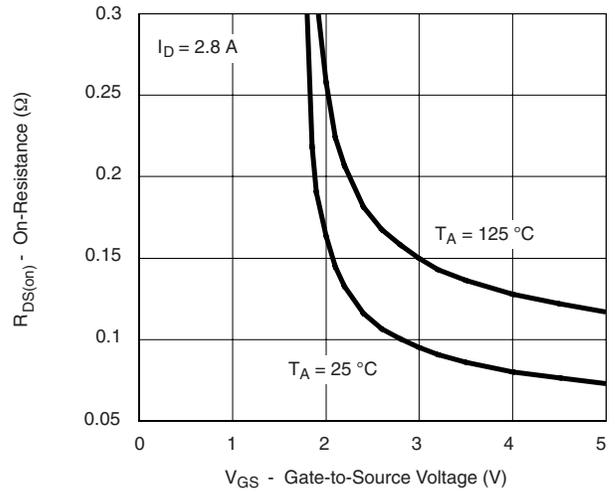
On-Resistance vs. Junction Temperature



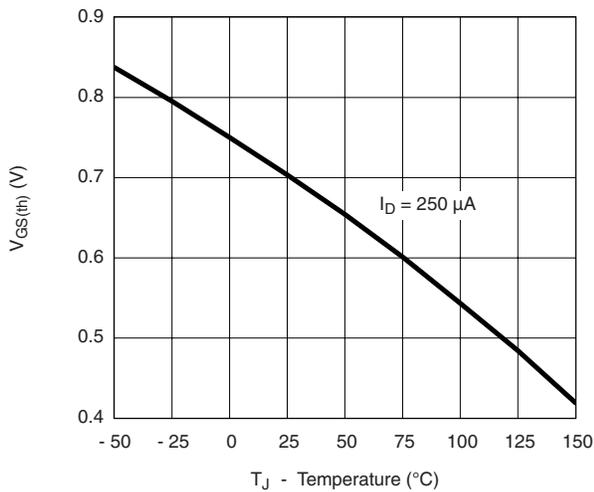
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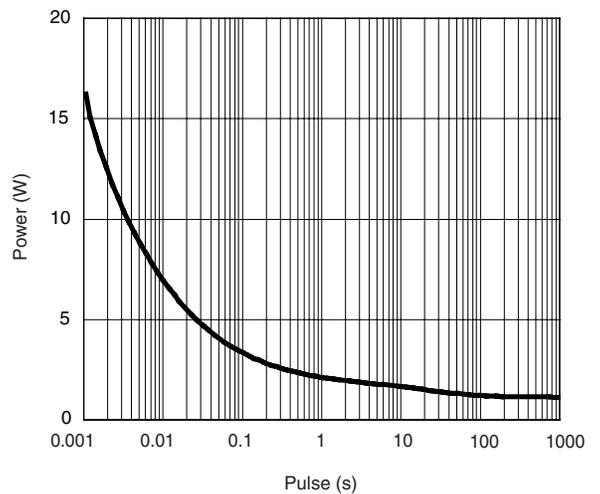
Source-Drain Diode Forward Voltage



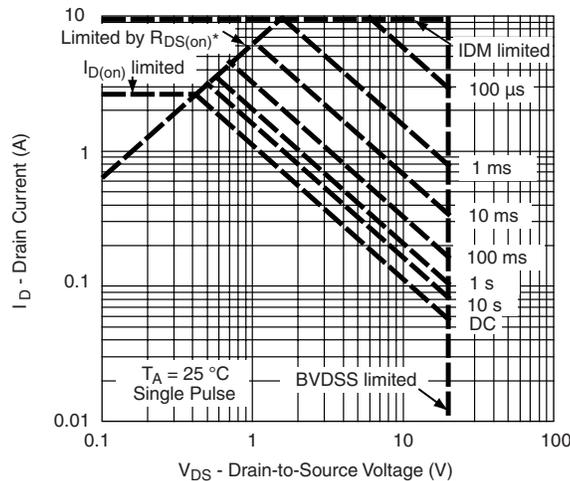
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



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

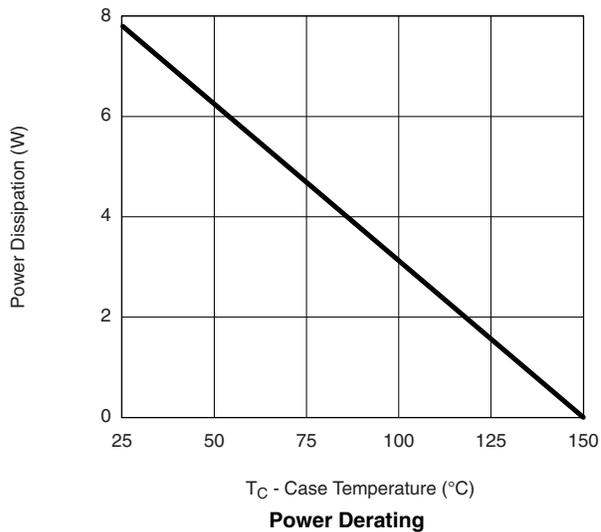
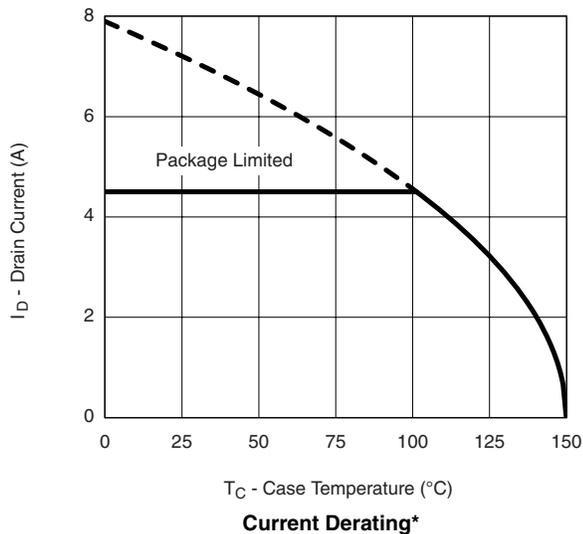
Safe Operating Area, Junction-to-Case

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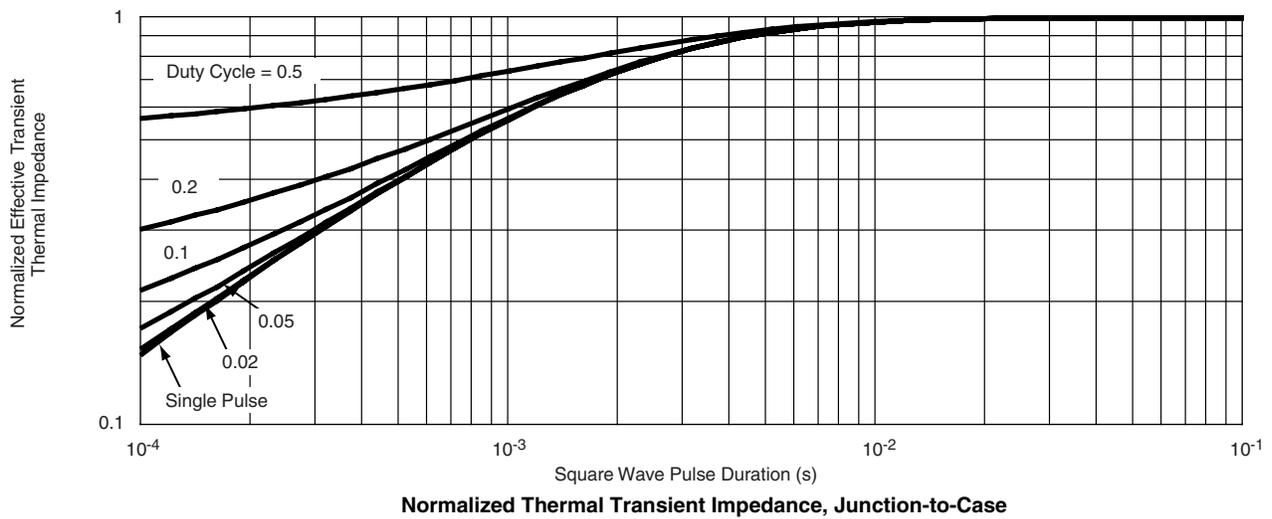
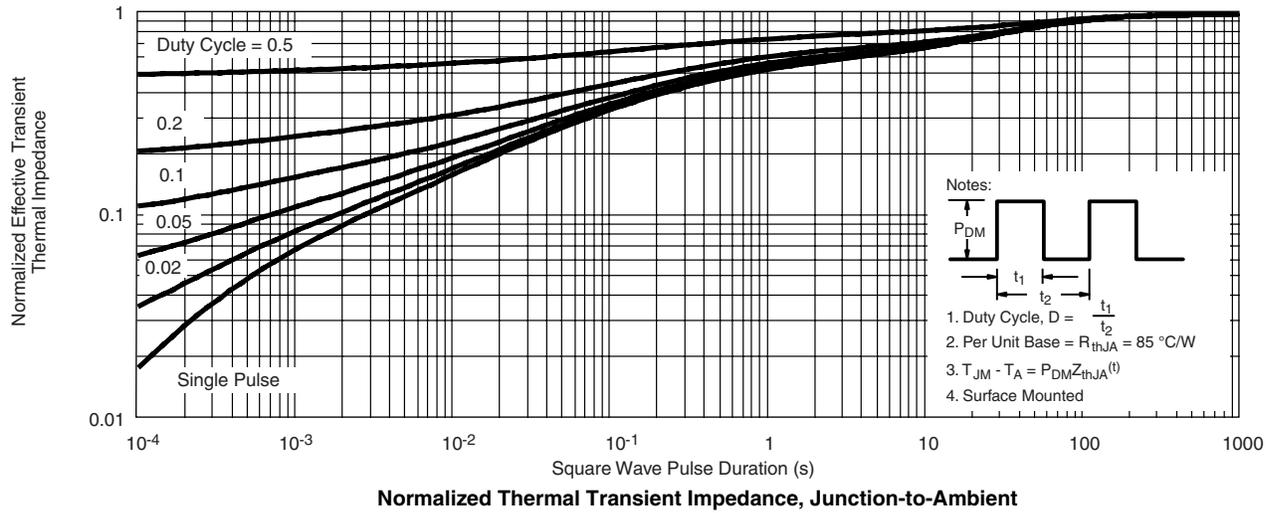
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



* The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^\circ\text{C}$, 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.



MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted

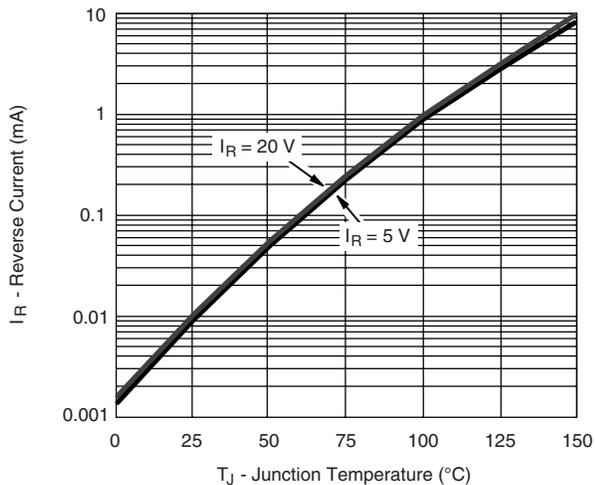


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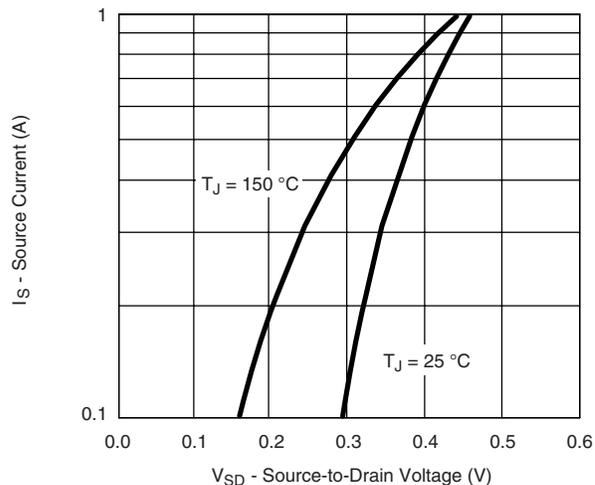
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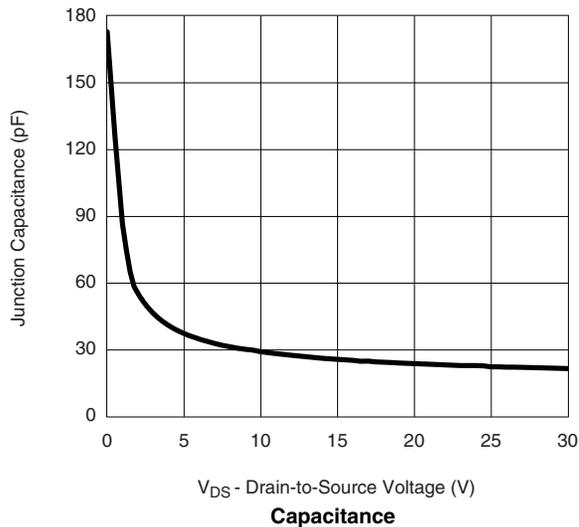
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Reverse Current vs. Junction Temperature



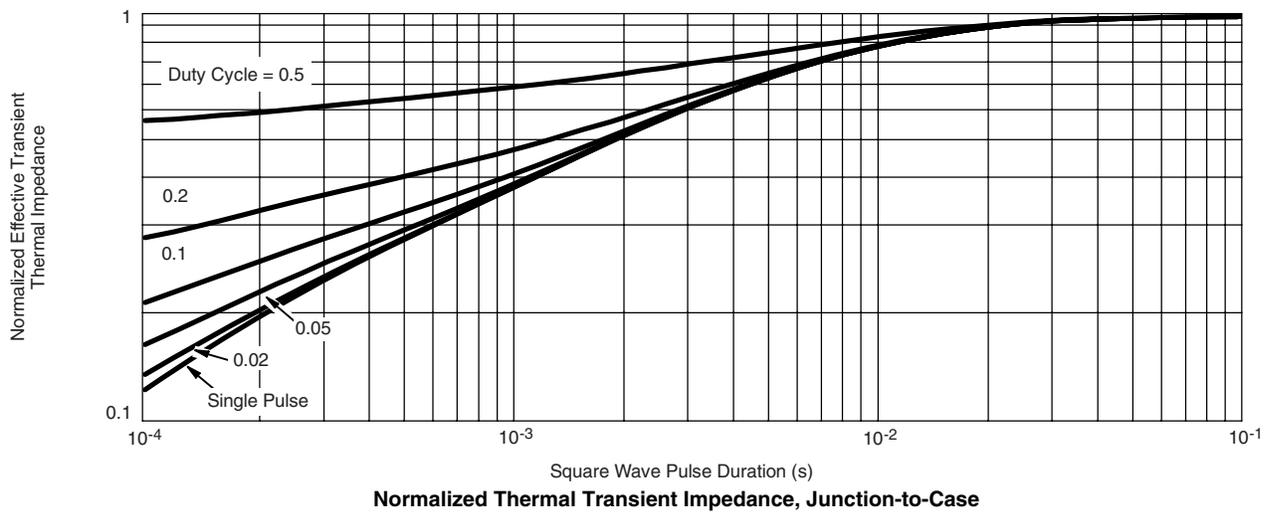
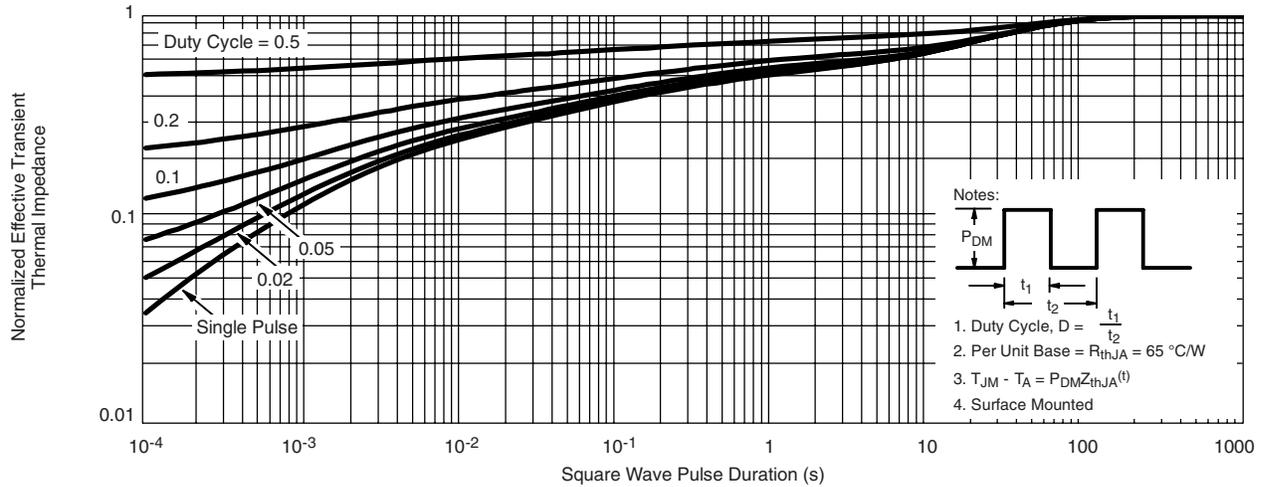
Forward Voltage Drop



Capacitance

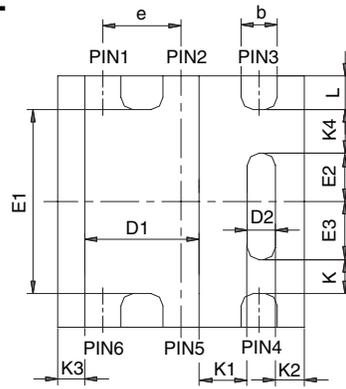


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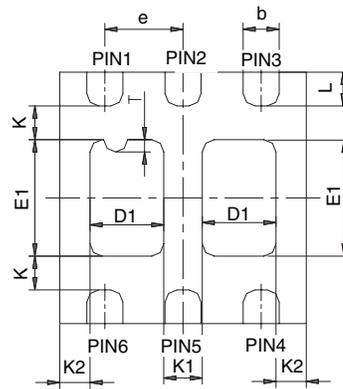


Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?70450.

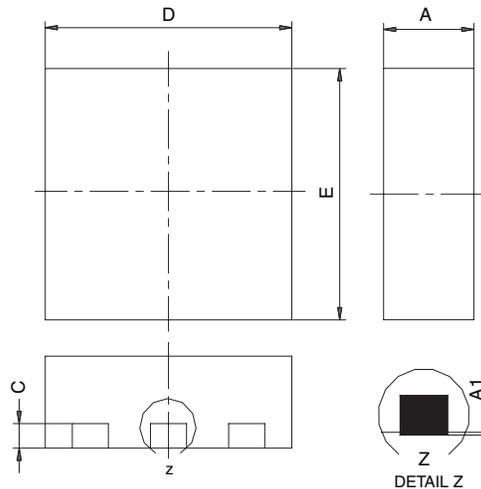
PowerPAK® SC70-6L



BACKSIDE VIEW OF SINGLE



BACKSIDE VIEW OF DUAL



- 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	0.23	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
D1	0.85	0.95	1.05	0.033	0.037	0.041	0.513	0.613	0.713	0.020	0.024	0.028
D2	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
E1	1.40	1.50	1.60	0.055	0.059	0.063	0.85	0.95	1.05	0.033	0.037	0.041
E2	0.345	0.395	0.445	0.014	0.016	0.018						
E3	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: C-07431 – Rev. C, 06-Aug-07
DWG: 5934



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Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

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Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9