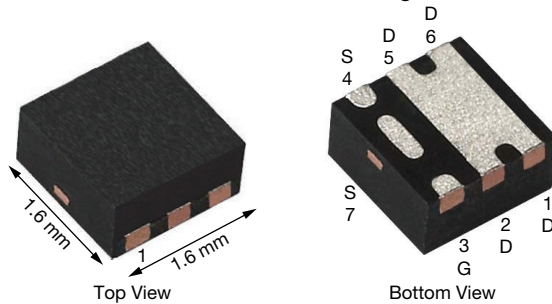


N-Channel 30 V (D-S) MOSFET

PowerPAK® SC-75-6L Single

Marking Code: AK

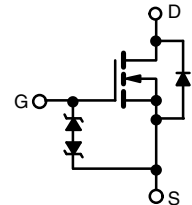
PRODUCT SUMMARY	
V_{DS} (V)	30
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.057
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5$ V	0.062
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 2.5$ V	0.078
Q_g typ. (nC)	3.5
I_D (A) ^{a, c}	6
Configuration	Single

FEATURES

- TrenchFET® power MOSFET
- Thermally enhanced PowerPAK® SC-70 package
 - Small footprint area
 - Low on-resistance
- Typical ESD protection: 1500 V (HBM)
- 100 % R_g tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE
APPLICATIONS

- Portable devices such as smart phones, tablet PCs and mobile computing
 - Load switch
 - DC/DC converter
 - Power management



N-Channel MOSFET

ORDERING INFORMATION

Package	PowerPAK SC-75
Lead (Pb)-free and halogen-free	SiB4316EDK-T1-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	V_{DS}	30	V	
Gate-source voltage	V_{GS}	± 12		
Continuous drain current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	6 ^a	A
		$T_C = 70$ °C	6 ^a	
		$T_A = 25$ °C	4.5 ^{b, c}	
		$T_A = 70$ °C	3.6 ^{b, c}	
Pulsed drain current ($t = 300$ μ s)	I_{DM}	15		
Continuous source-drain diode current	I_S	$T_C = 25$ °C	6 ^a	
		$T_A = 25$ °C	1.63 ^{b, c}	
Maximum power dissipation	P_D	$T_C = 25$ °C	10	W
		$T_C = 70$ °C	6.4	
		$T_A = 25$ °C	1.95 ^{b, c}	
		$T_A = 70$ °C	1.25 ^{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}	51	64	°C/W
Maximum junction-to-case (drain)	R_{thJC}	10	12.5	

Notes

- Package limited
- Surface mounted on 1" x 1" FR4 board
- $t = 5$ s
- See solder profile (www.vishay.com/doc?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
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components
- Maximum under steady state condition is 100 °C/W



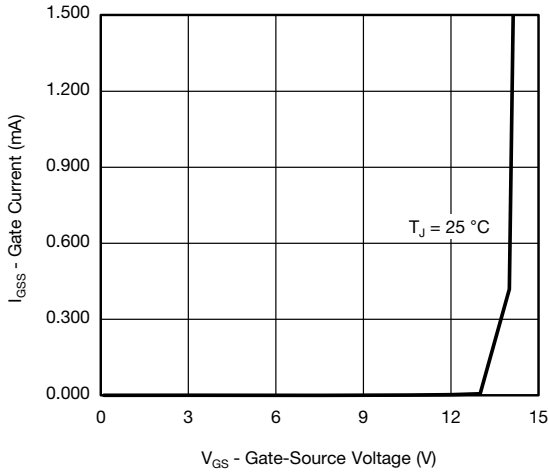
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$	-	34	-	mV/ $^\circ\text{C}$
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	-3.3	-	
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.6	-	1.4	V
Gate-source leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$	-	-	± 0.5	μA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$	-	-	± 20	
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	10	
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 4\text{ A}$	-	0.047	0.057	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 3\text{ A}$	-	0.051	0.062	
		$V_{GS} = 2.5\text{ V}, I_D = 1\text{ A}$	-	0.062	0.078	
Forward transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 3\text{ A}$	-	13	-	S
Dynamic ^b						
Total gate charge	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 4\text{ A}$	-	7.5	12	nC
		$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 4\text{ A}$	-	3.5	5.5	
Gate-source charge	Q_{gs}		-	1.8	-	
Gate-drain charge	Q_{gd}	-	0.7	-	-	
Gate resistance	R_g	$f = 1\text{ MHz}$	0.6	3.3	6.6	Ω
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 4.7\text{ }\Omega$ $I_D \cong 3.2\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$	-	20	40	ns
Rise time	t_r		-	60	120	
Turn-off delay time	$t_{d(off)}$		-	25	50	
Fall time	t_f		-	45	90	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 4.7\text{ }\Omega$ $I_D \cong 3.2\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$	-	1.5	5	
Rise time	t_r		-	30	60	
Turn-off delay time	$t_{d(off)}$		-	15	30	
Fall time	t_f		-	50	100	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	3.9	A
Pulse diode forward current	I_{SM}	-	-	-	15	
Body diode voltage	V_{SD}	$I_S = 3.2\text{ A}, V_{GS} = 0\text{ V}$	-	0.87	1.2	V
Body diode reverse recovery time	t_{rr}	$I_F = 3.2\text{ A}, dI/dt = 100\text{ A}/\mu\text{s},$ $T_J = 25\text{ }^\circ\text{C}$	-	10	20	ns
Body diode reverse recovery charge	Q_{rr}		-	4	10	nC
Reverse recovery fall time	t_a		-	5.3	-	ns
Reverse recovery rise time	t_b		-	4.6	-	

Notes

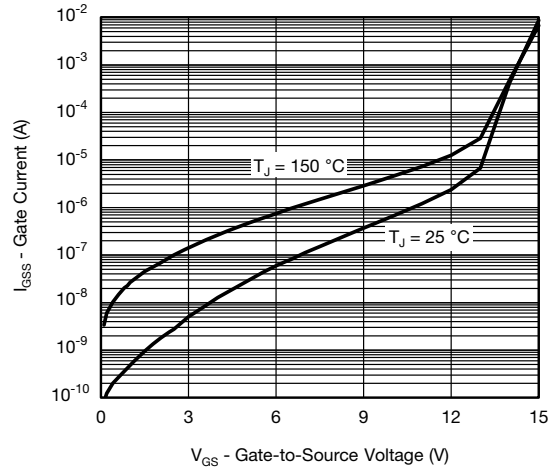
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- b. Guaranteed by design, not subject to production testing

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.

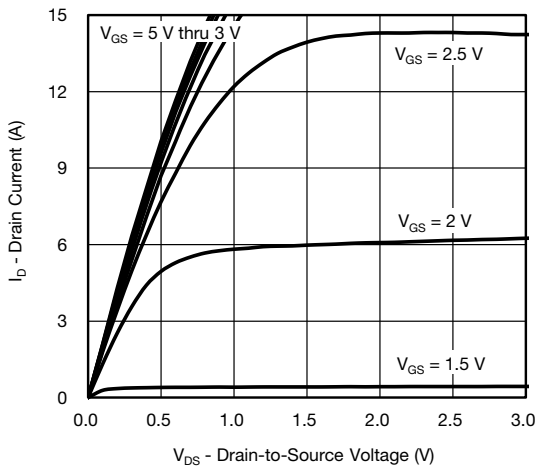
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



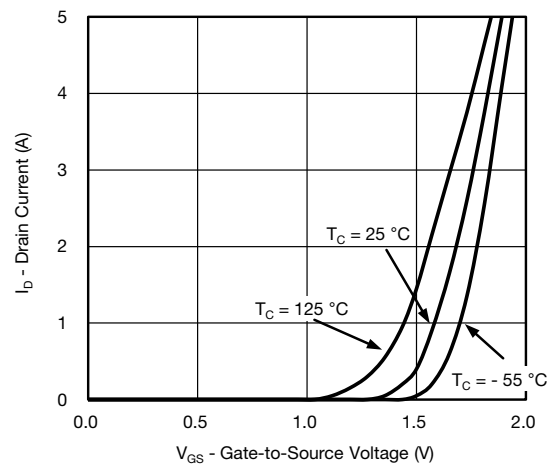
Gate Current vs. Gate-Source Voltage



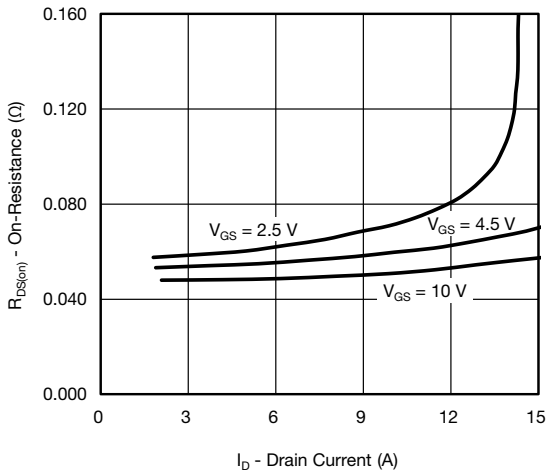
Gate Current vs. Gate-Source Voltage



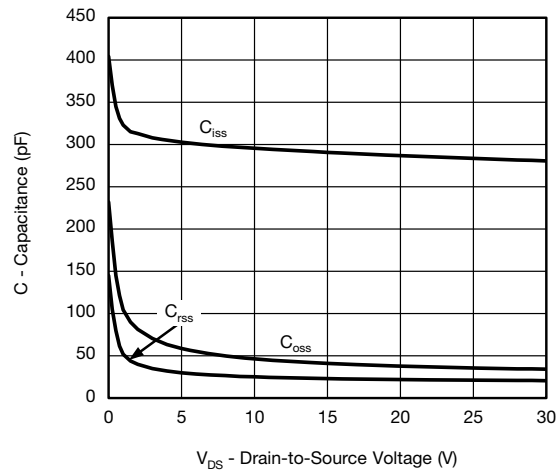
Output Characteristics



Transfer Characteristics



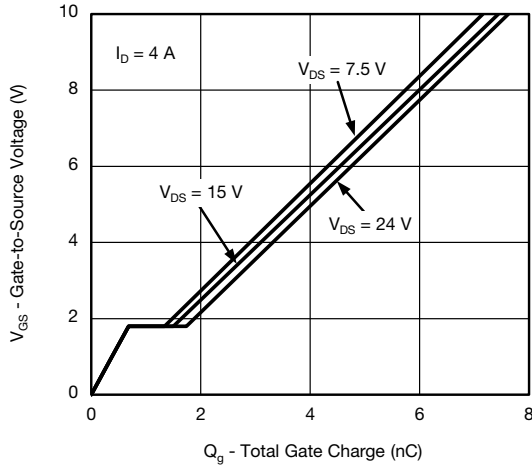
On-Resistance vs. Drain Current and Gate Voltage



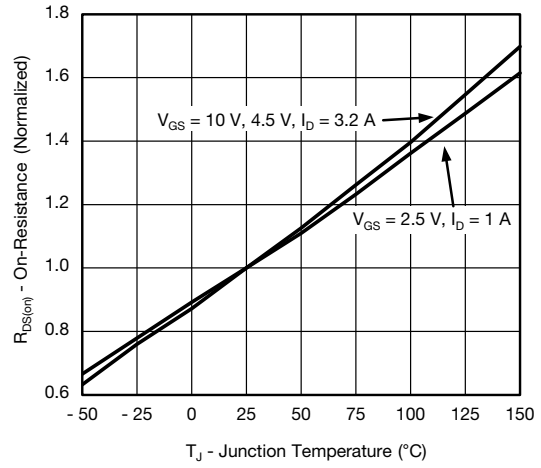
Capacitance



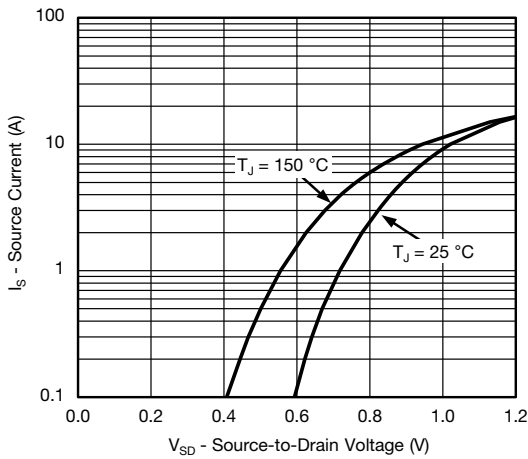
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



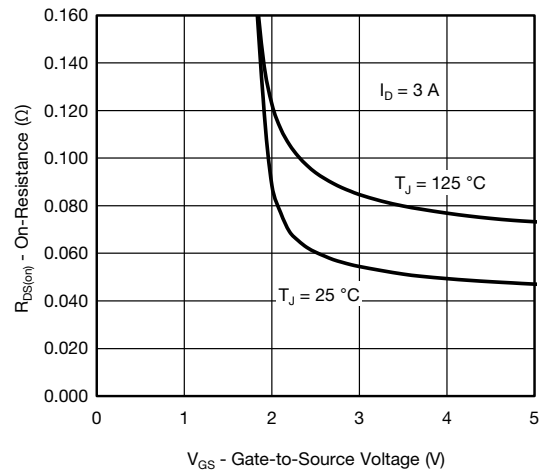
Gate Charge



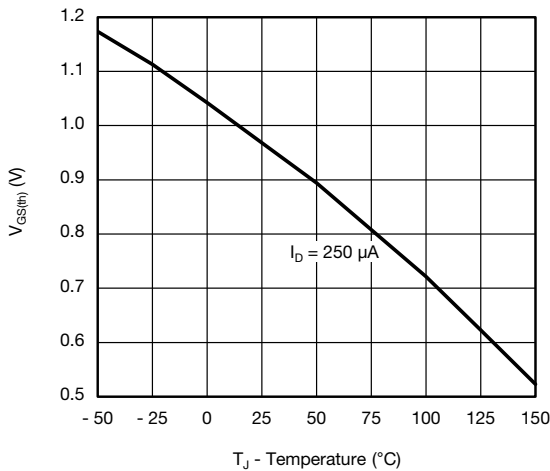
On-Resistance vs. Junction Temperature



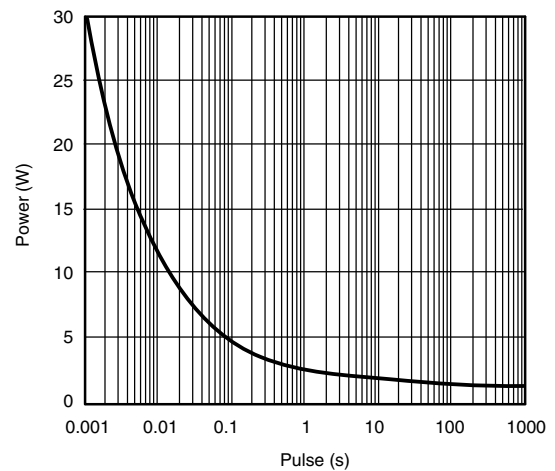
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



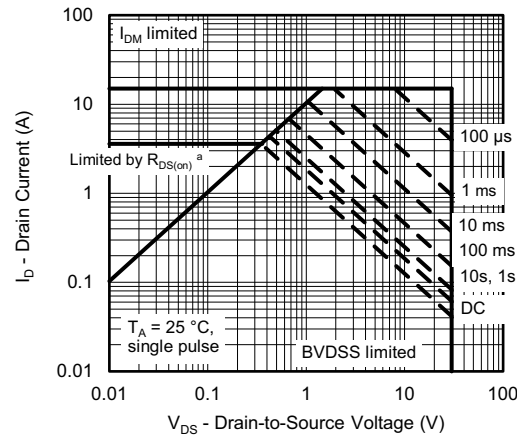
Threshold Voltage



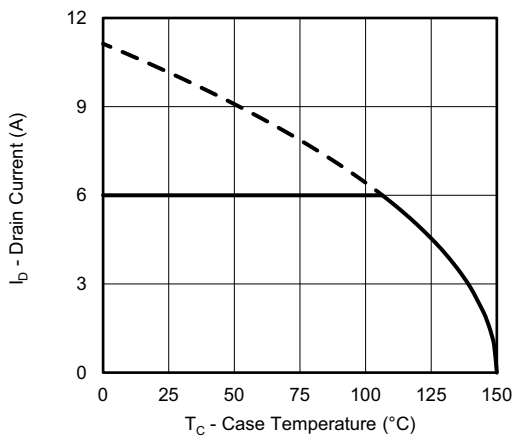
Single Pulse Power (Junction-to-Ambient)



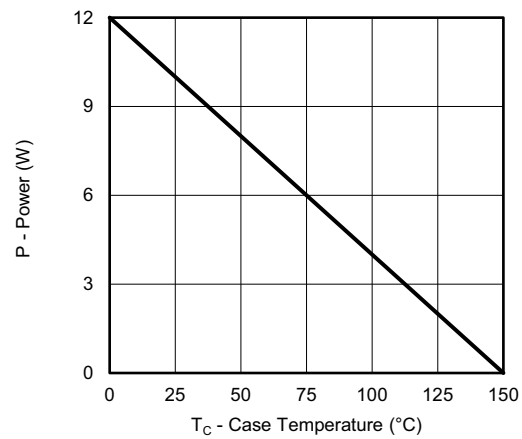
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Safe Operating Area, Junction-to-Ambient



Current Derating ^a



Power Derating

Note

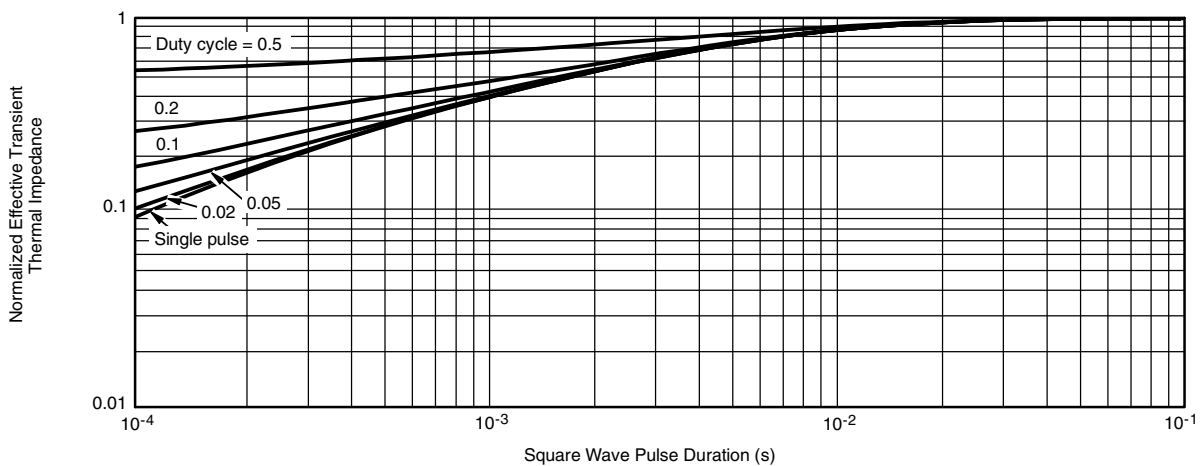
- a. The power dissipation P_D is based on T_J (max.) = 150 $^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below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



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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