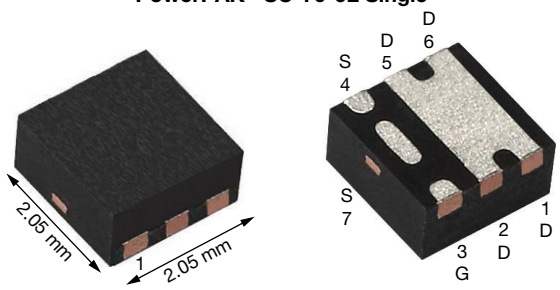
P-Channel 30 V (D-S) MOSFET

PowerPAK® SC-70-6L Single



Top View Bottom View

Marking code: KD

FEATURES

- TrenchFET® power MOSFET
- 100 % R_g tested
- Thermally enhanced PowerPAK® SC-70 package
  - Small footprint area
  - Low on-resistance
- Typical ESD protection: 3000 V (HBM)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

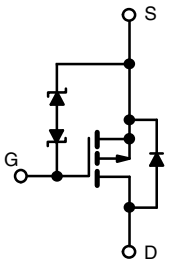
Pb-free

RoHS COMPLIANT

HALOGEN FREE

APPLICATIONS

- Power management for portable and consumer
- Load switch
- Charger switches
- Battery switches



P-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	-30
$R_{DS(on)}$ max. (Ω) at V_{GS} = -10 V	0.045
$R_{DS(on)}$ max. (Ω) at V_{GS} = -4.5 V	0.053
$R_{DS(on)}$ max. (Ω) at V_{GS} = -2.5 V	0.081
Q_g typ. (nC)	10.6
I_D (A) [a, e]	-9
Configuration	Single

ORDERING INFORMATION	
Package	PowerPAK SC-70
Lead (Pb)-free and halogen-free	SiA4371EDJ-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)	T_C = 25 °C	I_D	-9 [e]	A
	T_C = 70 °C		-9 [e]	
	T_A =25 °C		-6.4 [b, c]	
	T_A = 70 °C		-5.1 [b, c]	
Pulsed drain current (t = 300 µs)		I_{DM}	-20	
Continuous source-drain diode current	T_C = 25 °C	I_S	-9 [e]	
	T_A = 25 °C		-2.4 [b, c]	
Maximum power dissipation	T_C = 25 °C	P_D	15.6	W
	T_C = 70 °C		10	
	T_A = 25 °C		2.9 [b, c]	
	T_A = 70 °C		1.9 [b, c]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) [c, d]			260	

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient [b, d]	t ≤ 5 s	R_{thJA}	32	43	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	6	8	

Notes

a. T_C = 25 °C
b. Surface mounted on 1" x 1" FR4 board
c. t = 5 s
d. Maximum under steady state conditions is 80 °C/W
e. Package limited

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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	-30	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	I_D = -250 μA	-	-24	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	2.2	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250 μA	-0.6	-	-1.5	V
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 V	-	-	± 10	μA
		V_{DS} = 0 V, V_{GS} = ± 4.5 V	-	-	± 1	
Zero gate voltage drain current	I_{DSS}	V_{DS} = -30 V, V_{GS} = 0 V	-	-	-1	
		V_{DS} = -30 V, V_{GS} = 0 V, T_J = 55 °C	-	-	-10	
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = -10 V, I_D = -3.7 A	-	0.034	0.045	Ω
		V_{GS} = -4.5 V, I_D = -2 A	-	0.041	0.053	
		V_{DS} = -2.5 V, I_D = -2 A	-	0.068	0.081	
Dynamic [b]						
Total gate charge	Q_g	V_{DS} = -15 V, V_{GS} = -10 V, I_D = -3.7 A	-	22.8	35	nC
		V_{DS} = -15 V, V_{GS} = -4.5 V, I_D = -3.7 A	-	10.6	16	
Gate-source charge	Q_{gs}		-	1.7	-	
Gate-drain charge	Q_{gd}		-	2.6	-	
Gate resistance	R_g	f = 1 MHz	2.2	11	22	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = -15 V, R_L = 5.2 Ω, I_D ≅ -2.9 A, V_{GEN} = -4.5 V, R_g = 1 Ω	-	28	42	ns
Rise time	t_r		-	65	98	
Turn-off delay time	$t_{d(off)}$		-	47	71	
Fall time	t_f		-	62	93	
Turn-on delay time	$t_{d(on)}$	V_{DD} = -15 V, R_L = 5.2 Ω, I_D ≅ -2.9 A, V_{GEN} = -10 V, R_g = 1 Ω	-	7	14	
Rise time	t_r		-	8	16	
Turn-off delay time	$t_{d(off)}$		-	52	78	
Fall time	t_f		-	52	78	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	T_C = 25 °C	-	-	-1.4	A
Pulse diode forward current	I_{SM}		-	-	-20	
Body diode voltage	V_{SD}	I_S = -2.9 A, V_{GS} = 0 V	-	-0.8	-1.2	V
Body diode reverse recovery time	t_{rr}	I_F = -2.9 A, di/dt = 100 A/μs, T_J = 25 °C	-	13	20	ns
Body diode reverse recovery charge	Q_{rr}		-	6	12	nC
Reverse recovery fall time	t_a		-	9	-	ns
Reverse recovery rise time	t_b		-	4	-	

Notes

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 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.

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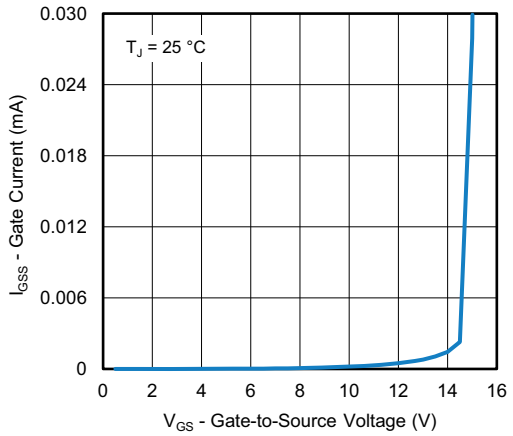
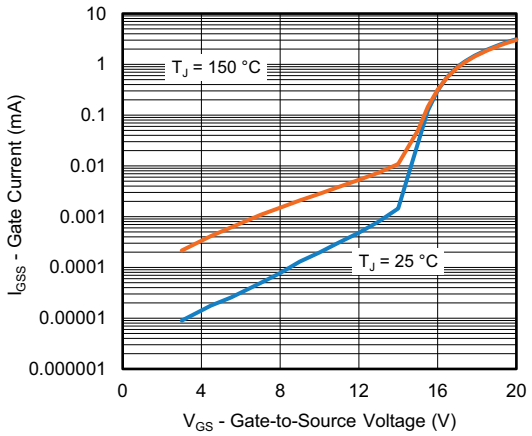


Gate Current vs. Gate-Source Voltage



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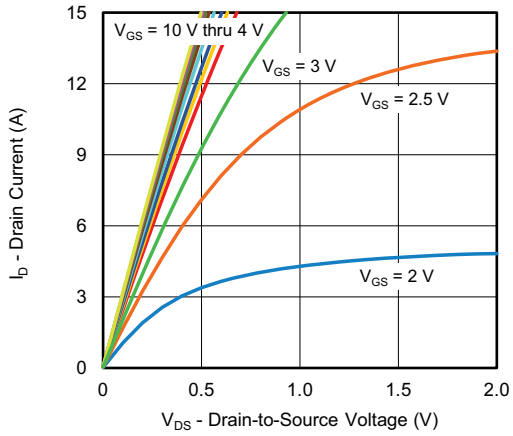
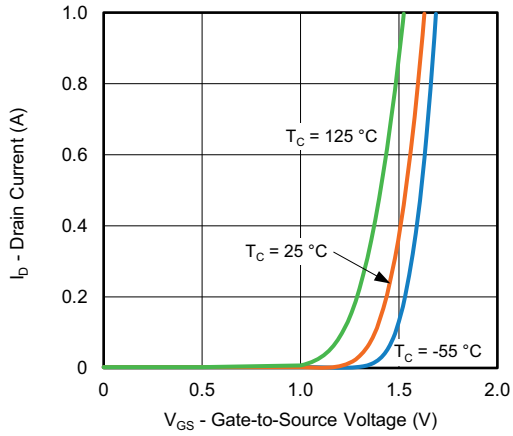
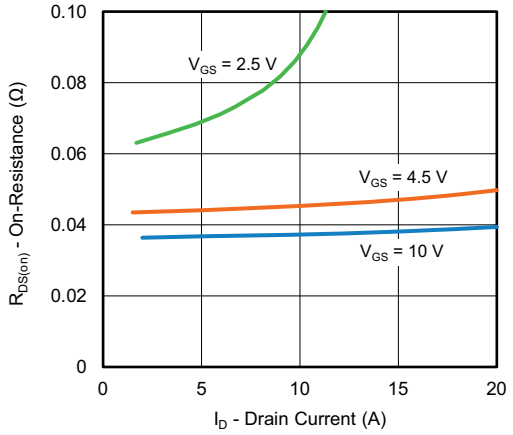


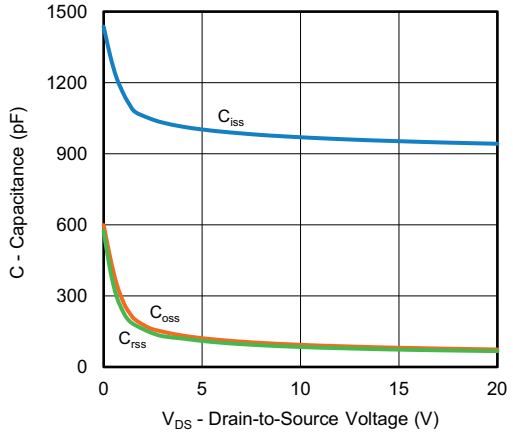
Output Characteristics



Transfer Characteristics



On-Resistance vs. Drain Current



Capacitance

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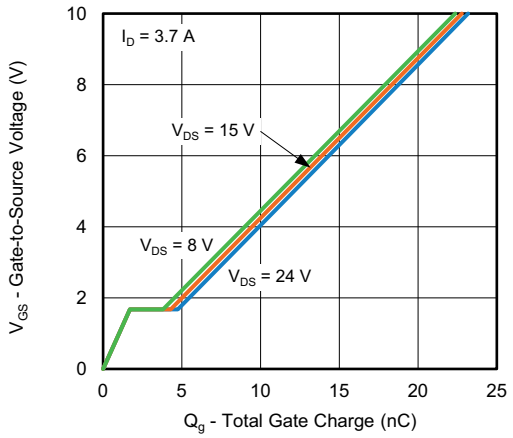
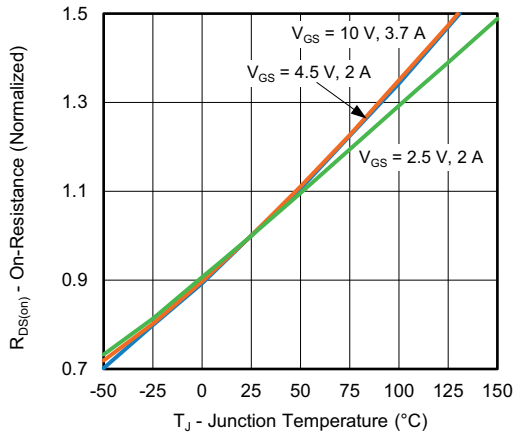
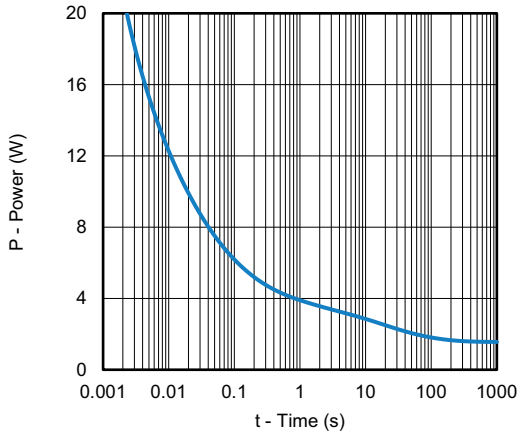


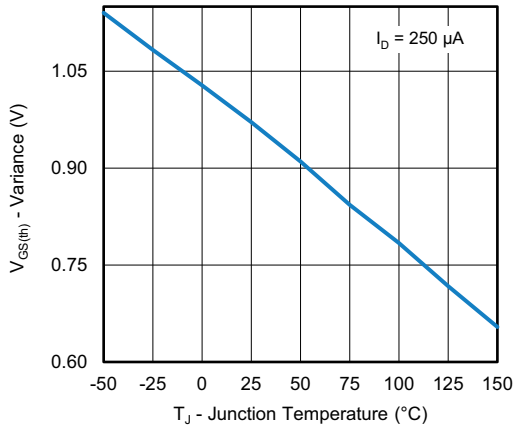
Gate Charge



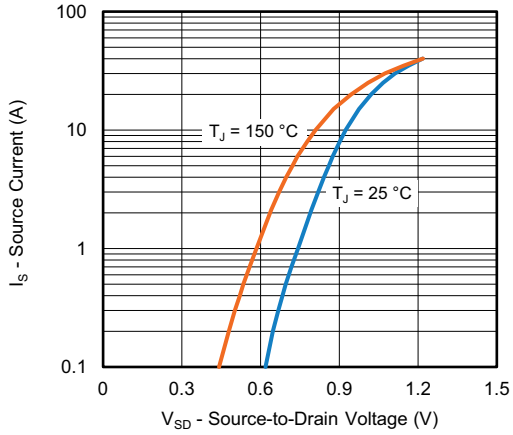
On-Resistance vs. Junction Temperature



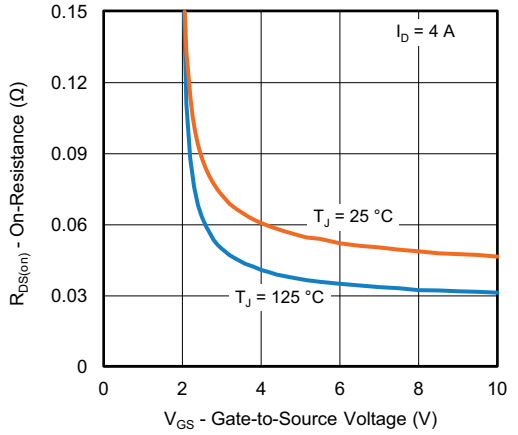
Single Pulse Power, Junction-to-Ambient



Threshold Voltage



Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

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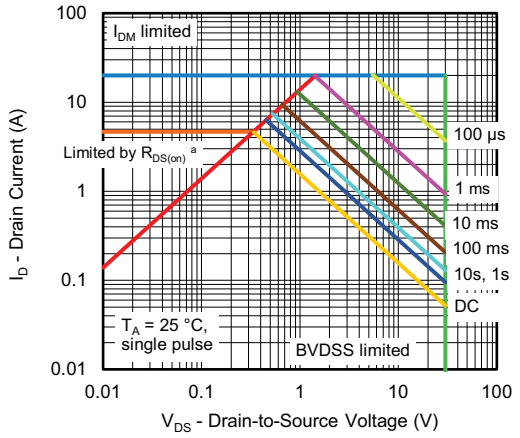
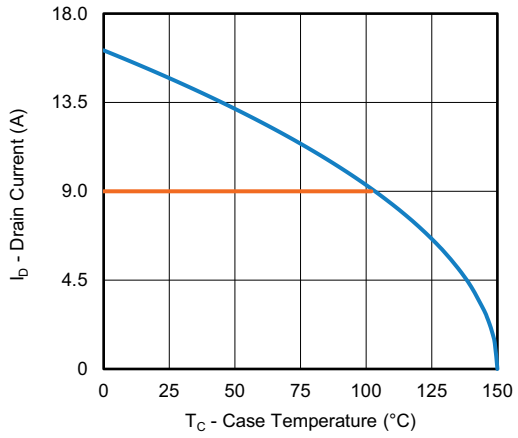
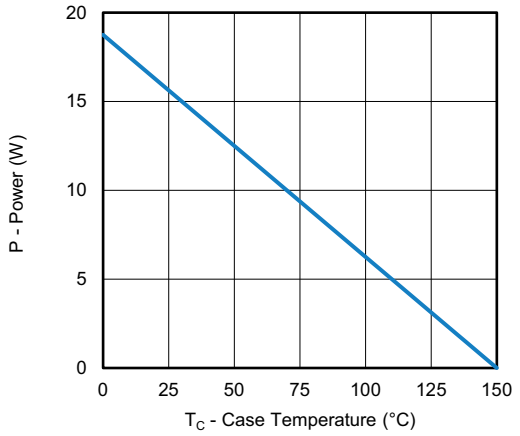


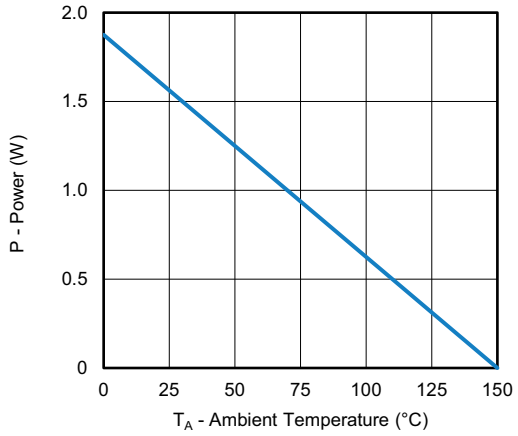
Safe Operating Area, Junction-to-Ambient



Current Derating [a]



Power Junction-to-Case



Power Junction-to-Ambient

Note

a. 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

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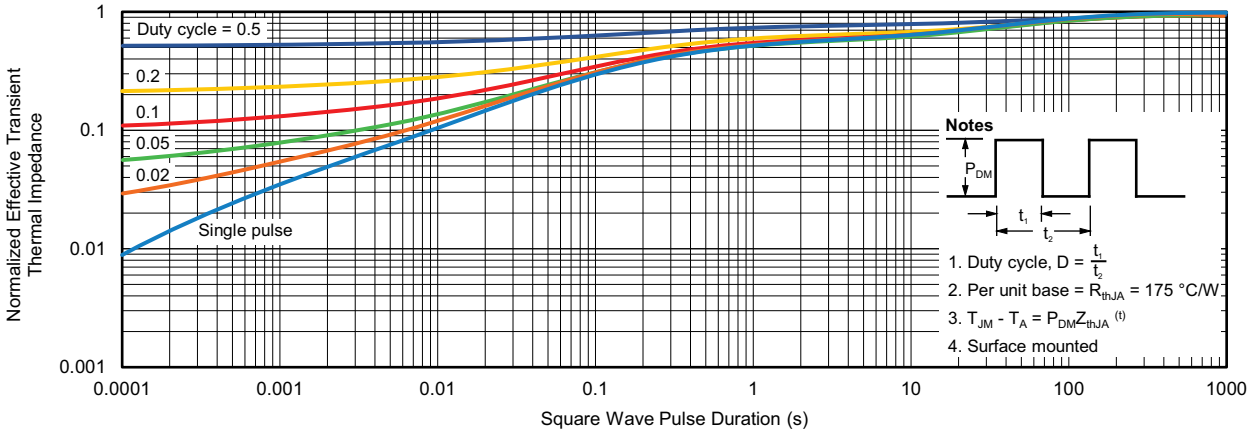
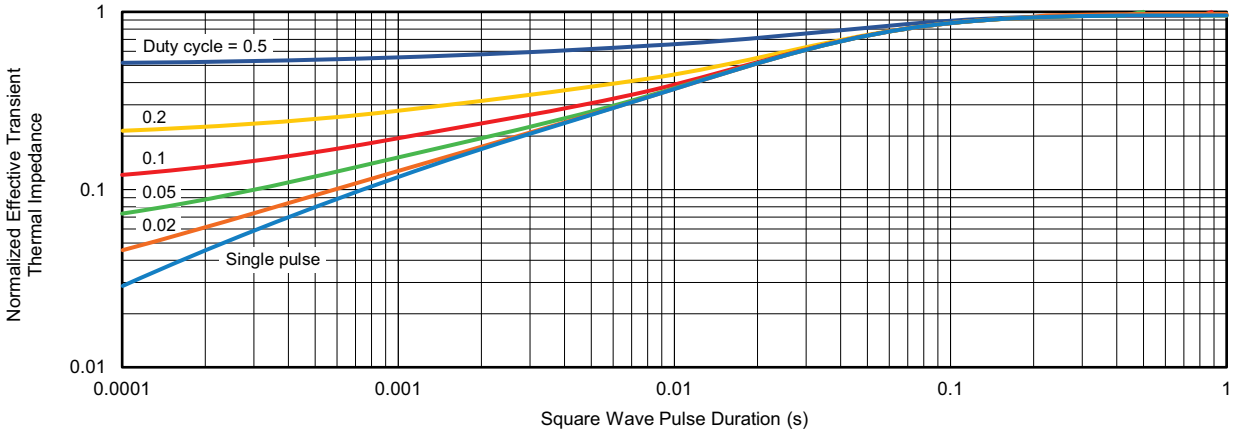


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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