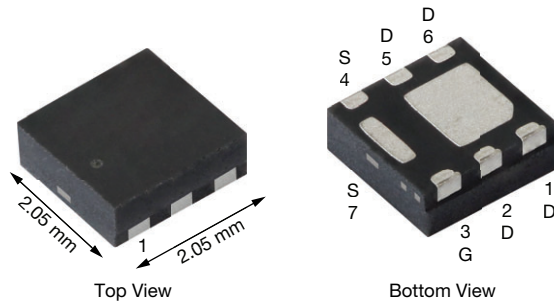


Automotive P-Channel 20 V (D-S) 175 °C MOSFET

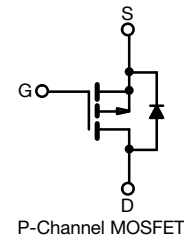
PowerPAK® SC-70W-6L Single

Marking Code: QKXXXX

PRODUCT SUMMARY	
V_{DS} (V)	-20
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.125
$R_{DS(on)}$ (Ω) at $V_{GS} = -2.5$ V	0.219
I_D (A)	-3.75
Configuration	Single

FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified
- Wettable flank terminals
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912

 AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE

ORDERING INFORMATION

Package	PowerPAK SC-70W-6L
Lead (Pb)-free and halogen-free	SQA401CEJW (for detailed order number please see www.vishay.com/doc?79776)

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	-20	V
Gate-source voltage	V_{GS}	± 12	
Continuous drain current ^a	I_D	$T_C = 25$ °C	-3.75
		$T_C = 125$ °C	-3.75
Continuous source current (diode conduction) ^a	I_S	-3.75	A
Pulsed drain current ^b	I_{DM}	-12	mJ
Single pulse avalanche current	I_{AS}	-8	
Single pulse avalanche energy			
Maximum power dissipation	P_D	$T_C = 25$ °C	13.6
		$T_C = 125$ °C	4.5
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R_{thJA}	90	°C/W
Junction-to-case (drain)			

Notes

- Package limited
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)
- See solder profile (www.vishay.com/doc?73257). The PowerPAK SC-70W-6L is a leadless package and features wettable flank terminals. The end of the lead terminal is plated with tin
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components
- Not intended for continuous use with positive gate voltage > 3.0 V



SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0, I_D = -250\text{ }\mu\text{A}$		-20	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$		-0.6	-1.0	-1.3	
Gate-source leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$		-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = -20\text{ V}$	-	-	-1	μA
		$V_{GS} = 0\text{ V}$	$V_{DS} = -20\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	-50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = -20\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	-150	
On-state drain current ^a	$I_{D(on)}$	$V_{GS} = -4.5\text{ V}$	$V_{DS} \geq 5\text{ V}$	-8	-	-	A
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$	$I_D = -2.4\text{ A}$	-	0.085	0.125	Ω
		$V_{GS} = -4.5\text{ V}$	$I_D = -2.4\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	-	0.175	
		$V_{GS} = -4.5\text{ V}$	$I_D = -2.4\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	-	0.200	
		$V_{GS} = -2.5\text{ V}$	$I_D = -1.8\text{ A}$	-	0.160	0.219	
Forward transconductance ^b	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -2.4\text{ A}$		-	6	-	S
Dynamic ^b							
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}$	$V_{DS} = -10\text{ V}, f = 1\text{ MHz}$	-	265	330	μF
Output capacitance	C_{oss}			-	75	94	
Reverse transfer capacitance	C_{rss}			-	50	63	
Total gate charge ^c	Q_g	$V_{GS} = -4.5\text{ V}$	$V_{DS} = -10\text{ V}, I_D = -2.4\text{ A}$	-	3.5	5.5	nC
Gate-source charge ^c	Q_{gs}			-	0.9	-	
Gate-drain charge ^c	Q_{gd}			-	1.2	-	
Gate resistance	R_g	f = 1 MHz		2.8	5.6	8.4	Ω
Turn-on delay time ^c	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 5.21\text{ }\Omega$ $I_D \cong -1.9\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		-	20	30	ns
Rise time ^c	t_r			-	18	27	
Turn-off delay time ^c	$t_{d(off)}$			-	19	28	
Fall time ^c	t_f			-	8	12	
Source-Drain Diode Ratings and Characteristics							
Pulsed current ^a	I_{SM}			-	-	-12	A
Forward voltage	V_{SD}	$I_F = -2\text{ A}, V_{GS} = 0$		-	-0.8	-1.2	V
Body diode reverse recovery time	t_{rr}	$I_F = -1.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		-	22	44	ns
Body diode reverse recovery charge	Q_{rr}			-	12	24	nC
Reverse recovery fall time	t_a			-	9	-	ns
Reverse recovery rise time	t_b			-	13	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$			-	-1	-	A

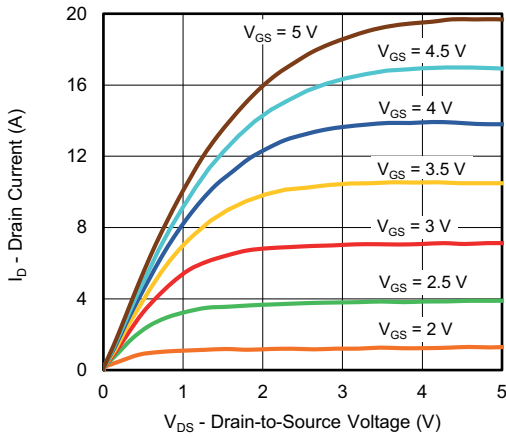
Notes

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

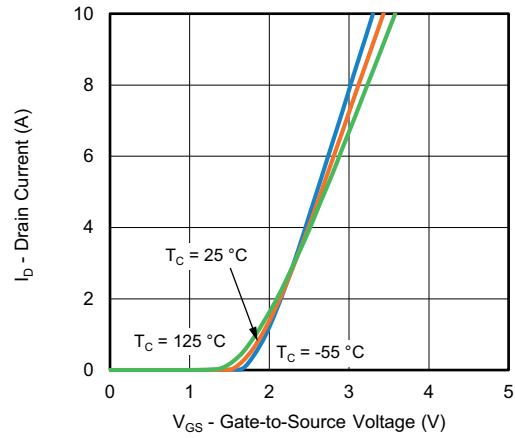
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



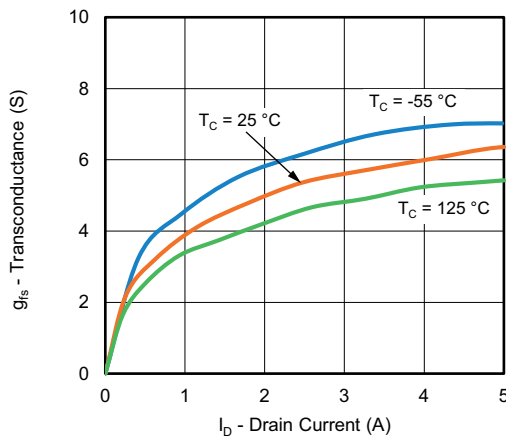
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



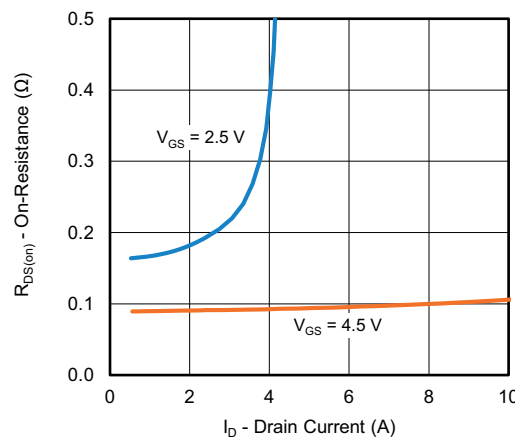
Output Characteristics



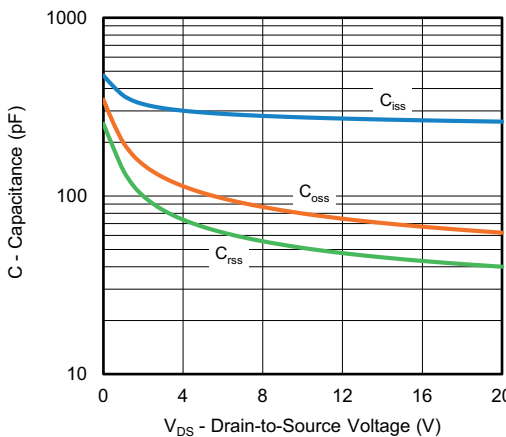
Transfer Characteristics



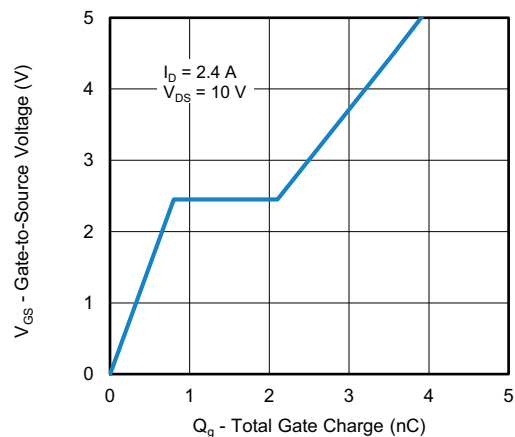
Transconductance



On-Resistance vs. Drain Current

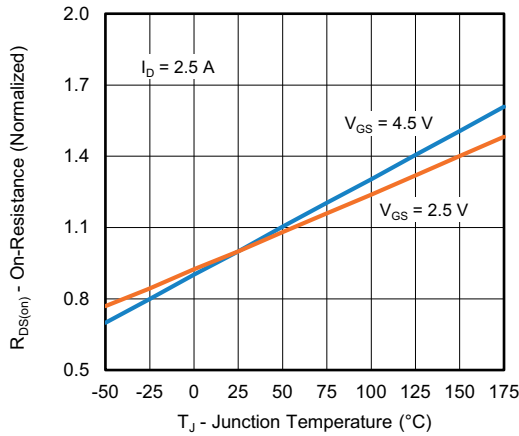


Capacitance

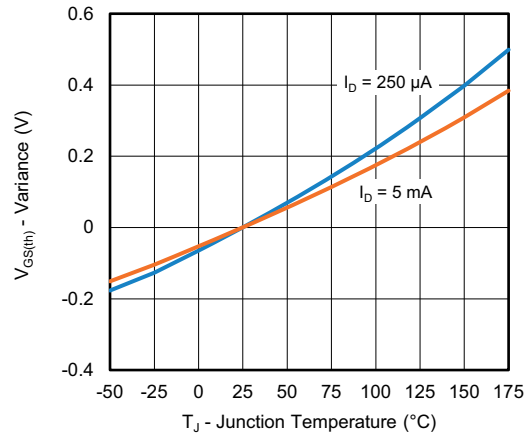


Gate Charge

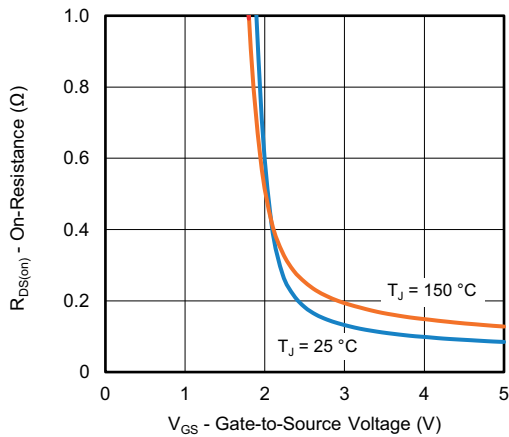
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



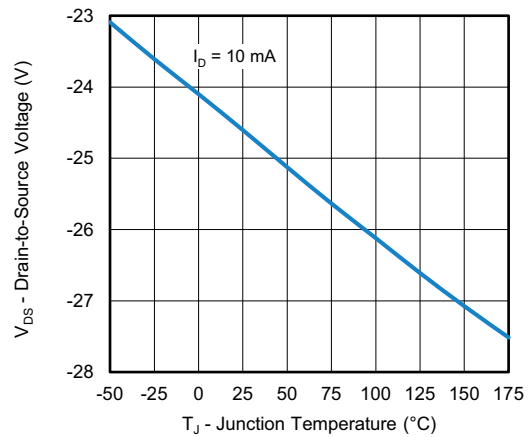
On-Resistance vs. Junction Temperature



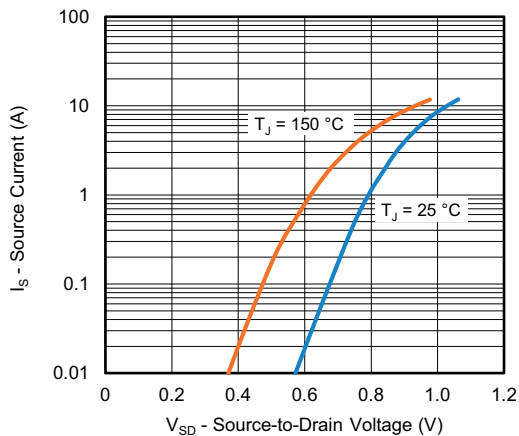
Threshold Voltage



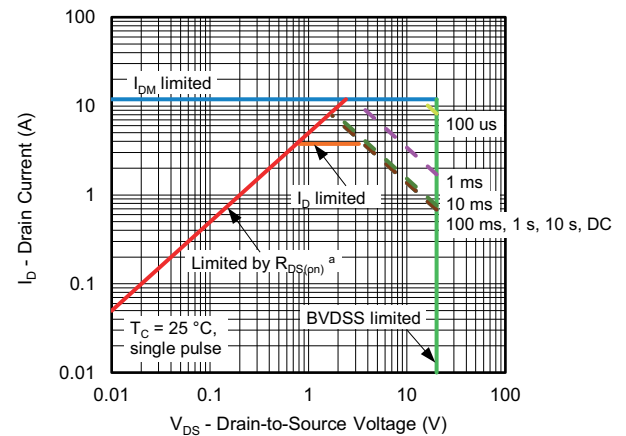
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature



Source-Drain Diode Forward Voltage



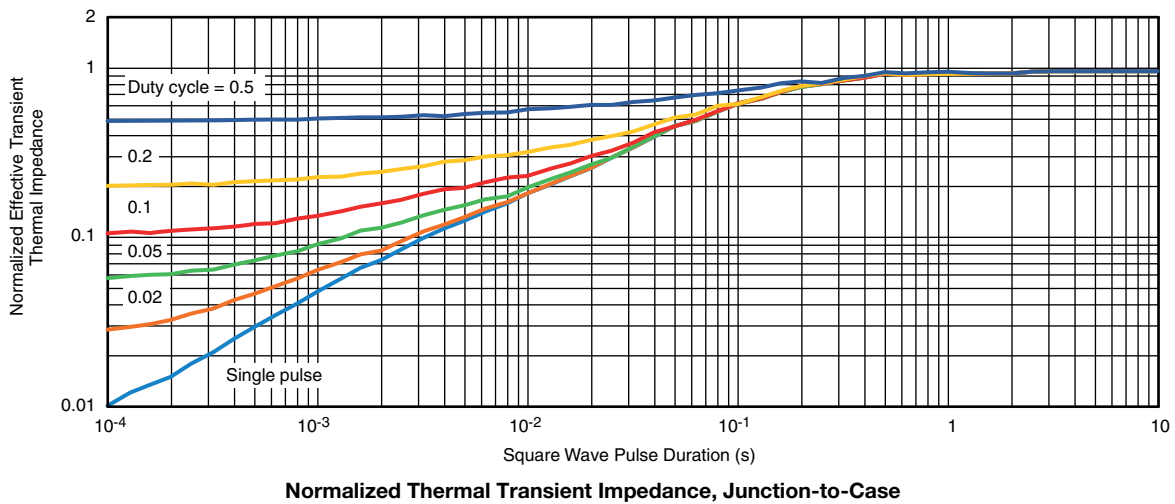
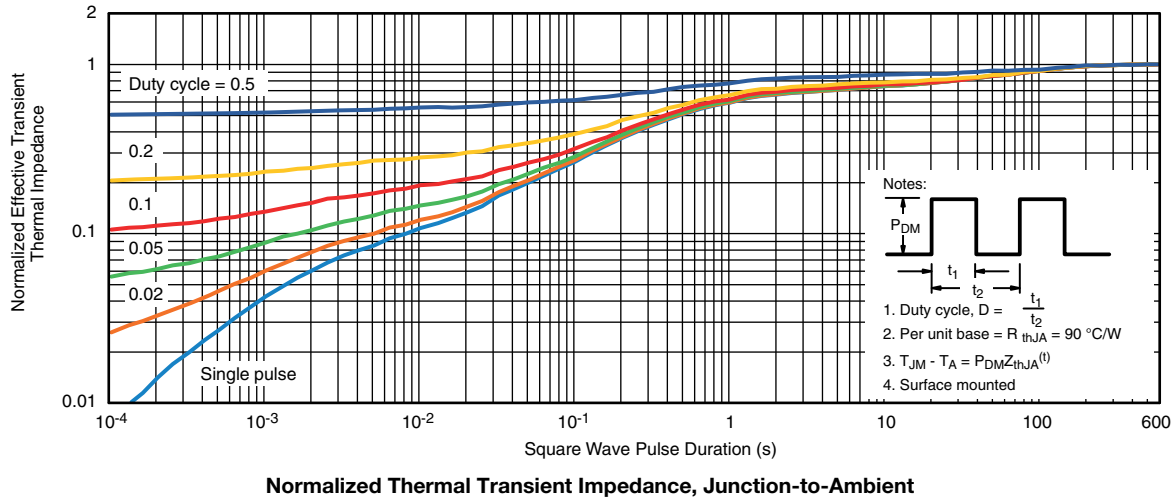
Safe Operating Area

Note

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



THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



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