Automotive N-Channel 30 V (D-S) 175 °C MOSFET

PowerPAK® SC-70W-6L Single
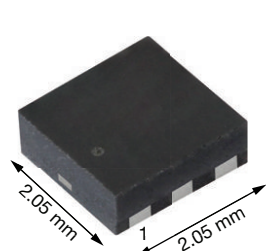
Top View
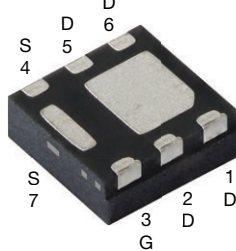
Bottom View

Marking Code: QABXXXX

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

Pb-free

RoHS COMPLIANT

HALOGEN FREE

N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	30
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0330
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.0540
I_D (A)	5.63
Configuration	Single
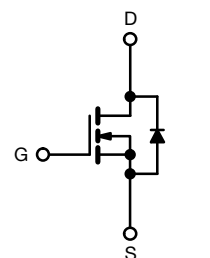
ORDERING INFORMATION

Package	PowerPAK SC-70W-6L
Lead (Pb)-free and halogen-free	SQA300CEJW (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}	30	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current [a]	T_C = 25 °C	I_D	5.63	A
	T_C = 125 °C		5.63	
Continuous source current (diode conduction) [a]		I_S	5.63	
Pulsed drain current [b]		I_{DM}	22.5	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	7	
Single pulse avalanche energy		E_{AS}	2.45	mJ
Maximum power dissipation	T_C = 25 °C	P_D	13.6	W
	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	PCB mount [c]	R_{thJA}	90	°C/W
Junction-to-case (drain)		R_{thJC}	11	

Notes
a. Package limited
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
c. When mounted on 1" square PCB (FR4 material)
d. 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.
e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components

SPECIFICATIONS (T_C = 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
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		1.5	2.0	2.5	
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V		-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{GS} = 0 V	V_{DS} = 30 V	-	-	1	µA
		V_{GS} = 0 V	V_{DS} = 30 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 30 V, T_J = 175 °C	-	-	250	
On-state drain current [a]	$I_{D(on)}$	V_{GS} = 10 V	$V_{DS} \geq$ 5 V	5	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 3 A	-	0.0210	0.0330	Ω
		V_{GS} = 10 V	I_D = 3 A, T_J = 125 °C	-	-	0.0486	
		V_{GS} = 10 V	I_D = 3 A, T_J = 175 °C	-	-	0.0571	
		V_{GS} = 4.5 V	I_D = 2.5 A	-	0.0331	0.0540	
Forward transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 3 A		-	16	-	S
Dynamic [b]							
Input capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	-	261	365	pF
Output capacitance	C_{oss}			-	77	110	
Reverse transfer capacitance	C_{rss}			-	16	23	
Total gate charge [c]	Q_g	V_{GS} = 10 V	V_{DS} = 15 V, I_D = 5 A	-	6	10	nC
Gate-source charge [c]	Q_{gs}			-	2.0	-	
Gate-drain charge [c]	Q_{gd}			-	2.0	-	
Gate resistance	R_g	f = 1 MHz		2.0	4.2	6.7	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 15 V, R_L = 7.5 Ω $I_D \cong$ 2 A, V_{GEN} = 10 V, R_g = 1 Ω		-	6	10	ns
Rise time [c]	t_r			-	4	8	
Turn-off delay time [c]	$t_{d(off)}$			-	12	20	
Fall time [c]	t_f			-	2	5	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed current [a]	I_{SM}			-	-	22.5	A
Forward voltage	V_{SD}	I_F = 3 A, V_{GS} = 0 V		-	0.84	1.2	V
Body diode reverse recovery time	t_{rr}	I_F = 2 A, di/dt = 100 A/µs		-	11	22	ns
Body diode reverse recovery charge	Q_{rr}			-	3	6	nC
Reverse recovery fall time	t_a			-	5	-	ns
Reverse recovery rise time	t_b			-	6	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$			-	-0.5	-	A

Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 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.
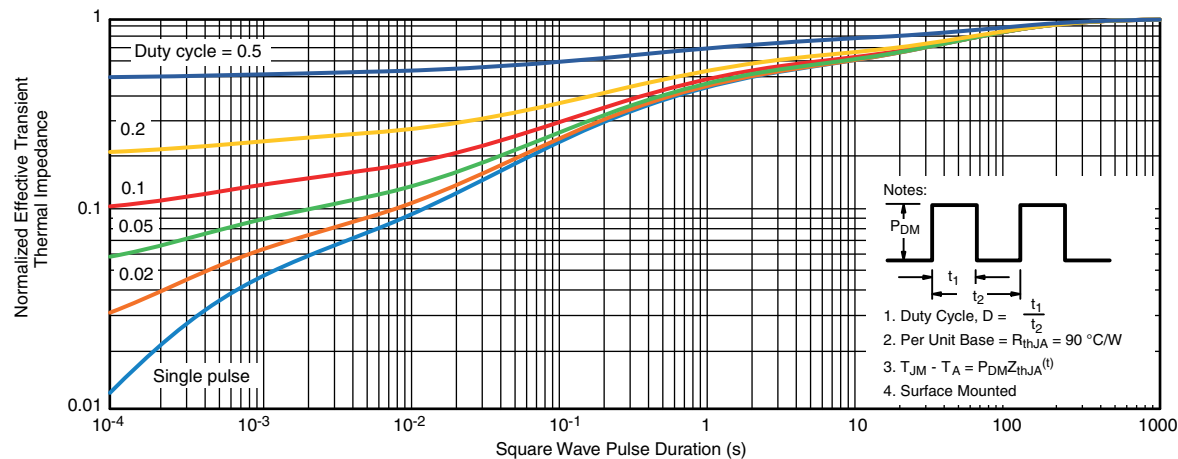
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)
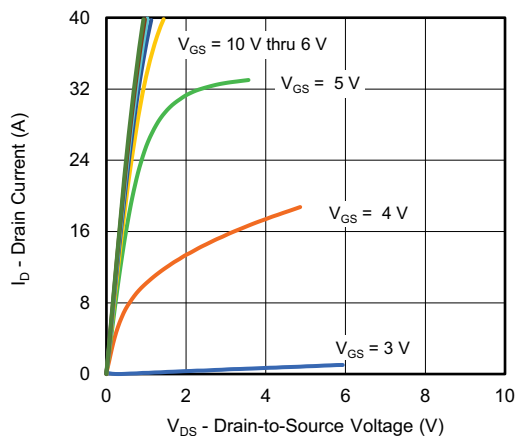
Output Characteristics
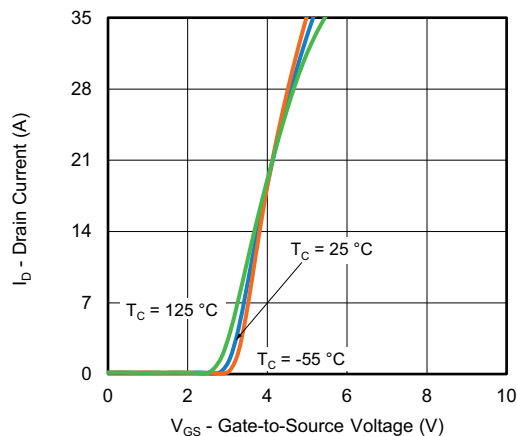
Transfer Characteristics
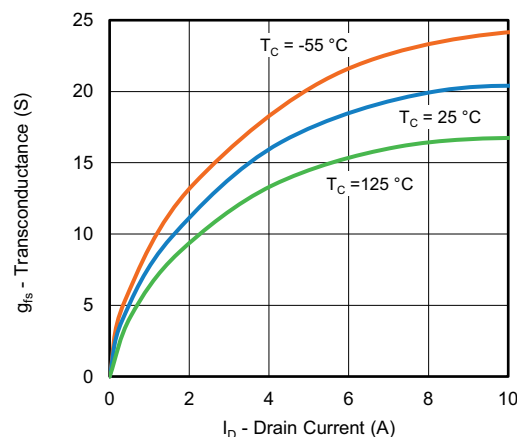
Transconductance
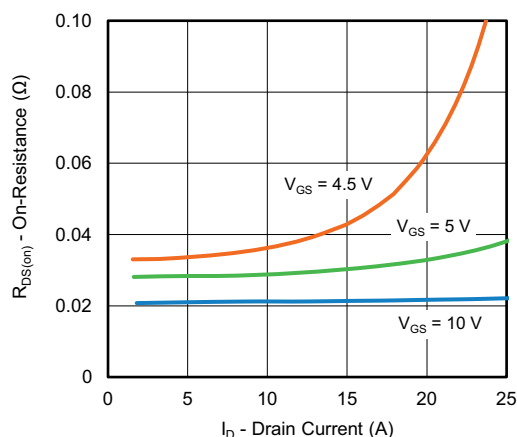
On-Resistance vs. Drain Current
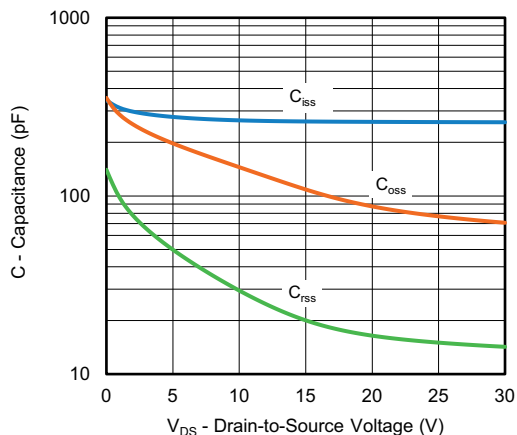
Capacitance
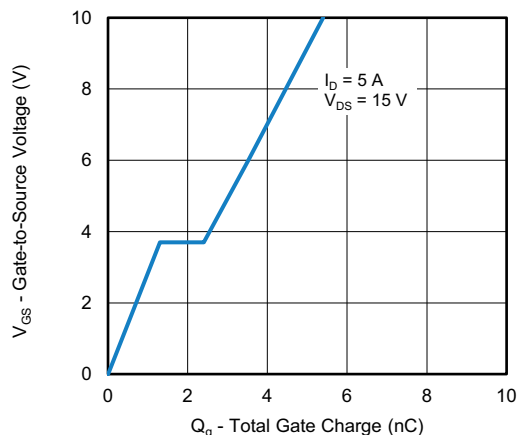
Gate Charge

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)
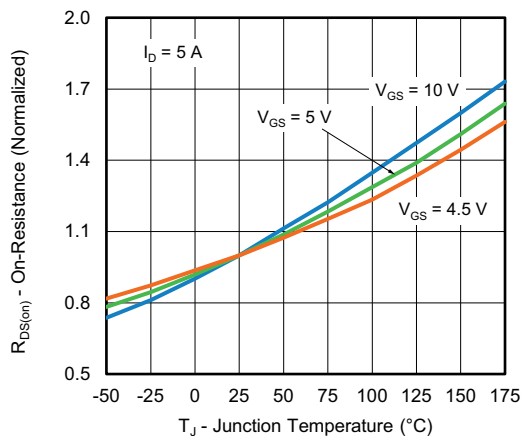
On-Resistance vs. Junction Temperature
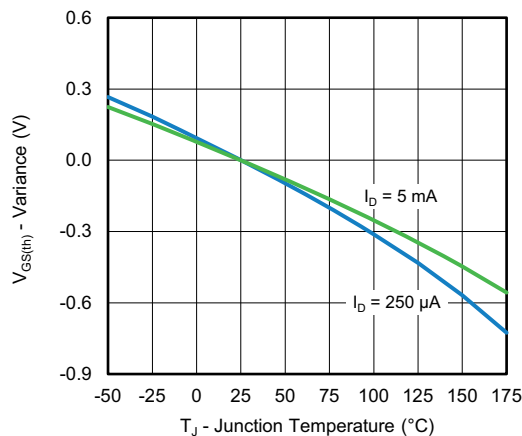
Threshold Voltage
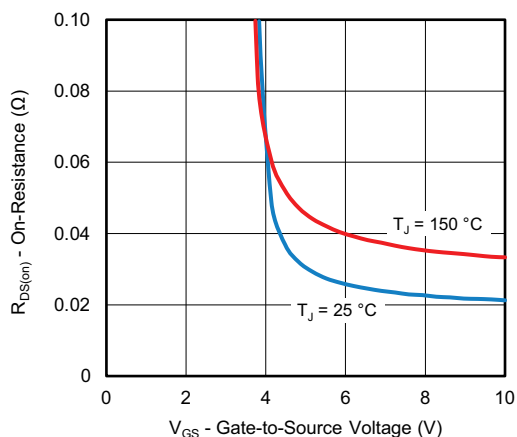
On-Resistance vs. Gate-to-Source Voltage
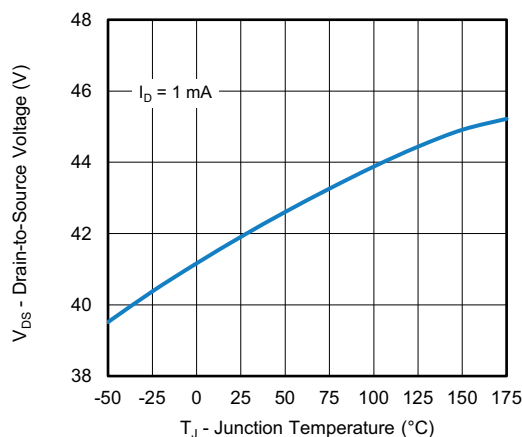
Drain Source Breakdown vs. Junction Temperature
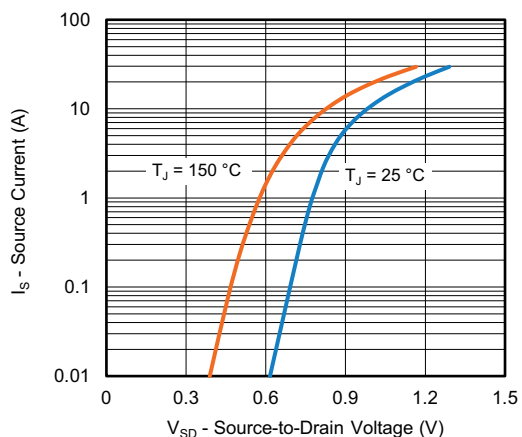
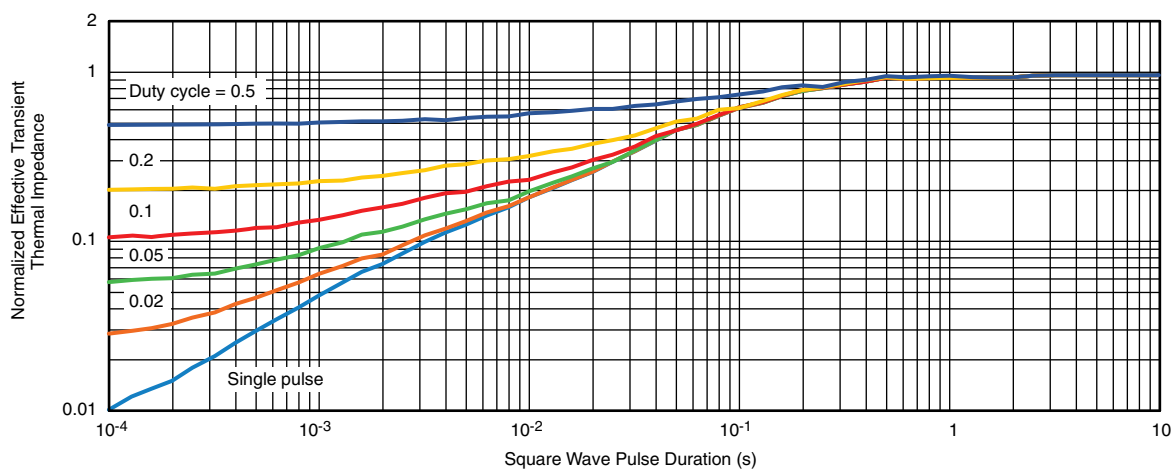**Source Drain Diode Forward Voltage**
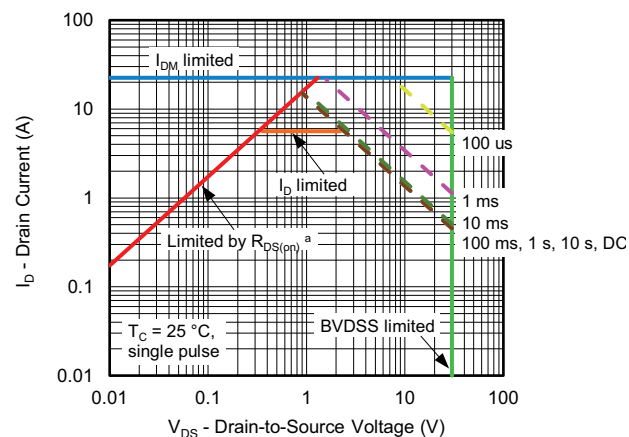
Safe Operating Area

Note

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

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)

Notes:

1. Duty Cycle, D = $\frac{t_1}{t_2}$
2. Per Unit Base = R_{thJA} = 90 °C/W
3. $T_{JM} - T_A = P_{DM}Z_{thJA}^{(t)}$
4. Surface Mounted

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case

For technical questions, contact: automostechsupport@vishay.com

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