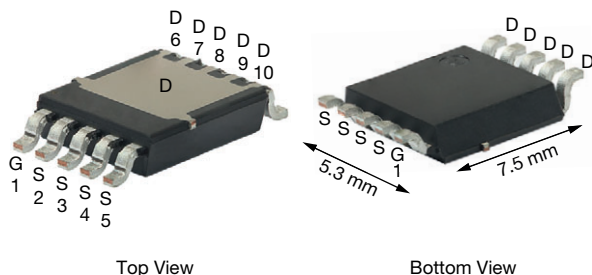


Automotive N-Channel 40 V (D-S) 175 °C MOSFET

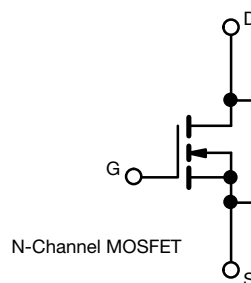
PowerPAK® SO-10LR


FEATURES

- TrenchFET® Gen IV power MOSFET
- AEC-Q101 qualified
- 100 % R_g and UIS tested
- Q_{gd}/Q_{gs} ratio < 1 optimizes switching characteristics
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE



PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.00124
I_D (A) ^d	328
Configuration	Single

ORDERING INFORMATION	
Package	PowerPAK SO-10LR
Lead (Pb)-free and halogen-free	SQJ136ER (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}	40	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current ^d	$T_C = 25$ °C	I_D	328	A
	$T_C = 125$ °C		189	
Continuous source current (diode conduction) ^d		I_S	223	
Pulsed drain current ^d		I_{DM}	840	
Single pulse avalanche current		I_{AS}	52	
Single pulse avalanche energy		E_{AS}	137	mJ
Maximum power dissipation	$T_C = 25$ °C	P_D	245	W
	$T_C = 125$ °C		81	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^b			260	

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient ^c	PCB mount ^a	R_{thJA}	42	°C/W
Junction-to-case (drain)		R_{thJC}	0.61	

Notes

- When mounted on 1" square PCB (FR4 material)
- See solder profile (www.vishay.com/doc?73257). 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
- Using thermal characterization methods based on JESD51-14
- Values based on R_{thJC} and T_C of 25 °C. Actual values achievable will be dependent on the thermal characteristics of the complete system

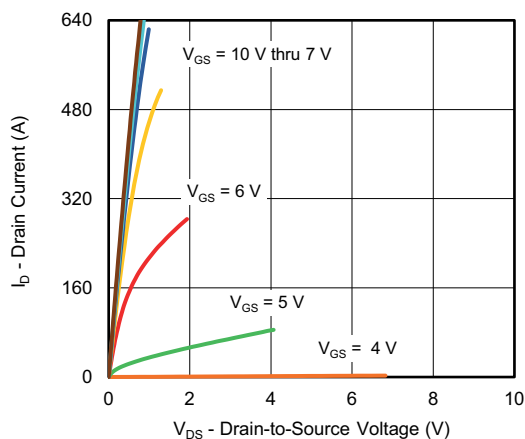
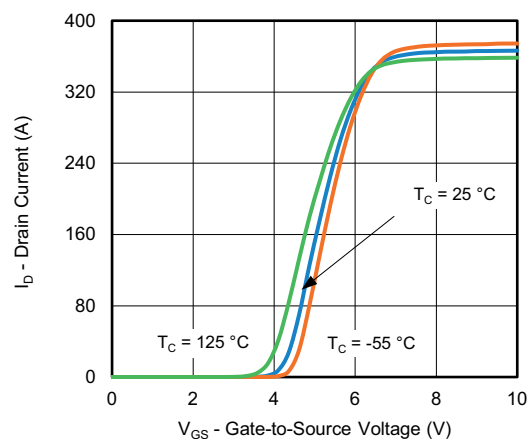
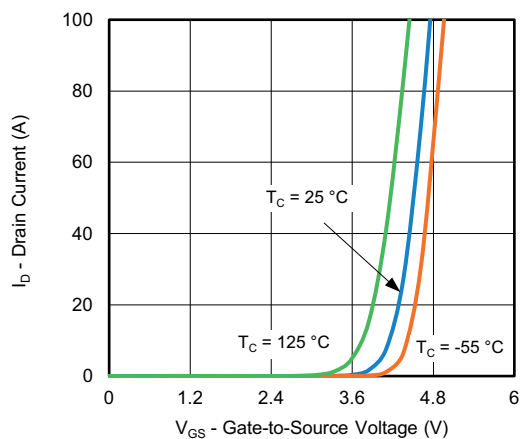
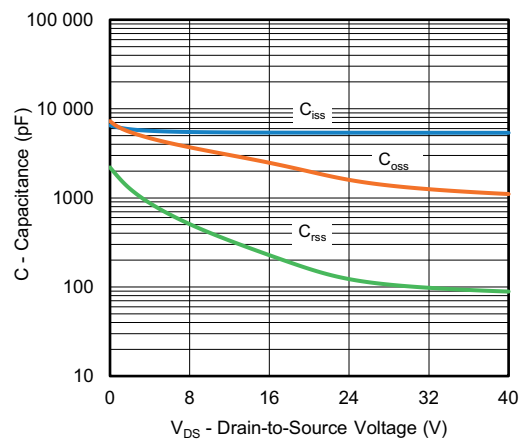
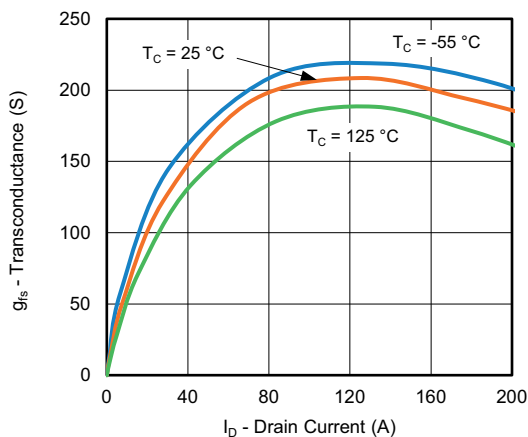
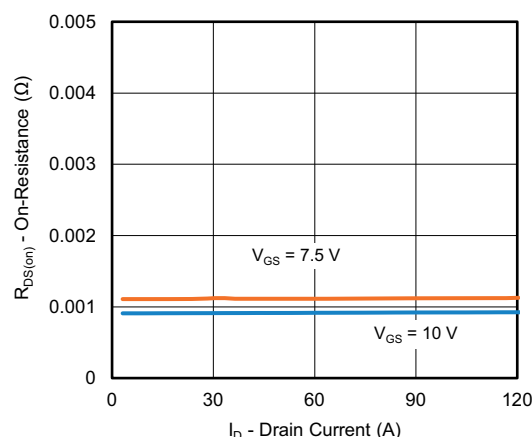


SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0, I _D = 250 μA		40	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.5	3.0	3.5	
Gate-source 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} = 40 V	-	-	10	μA
		V _{GS} = 0 V	V _{DS} = 40 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 40 V, T _J = 175 °C	-	-	250	
On-state drain current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	30	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 15 A	-	0.00103	0.00124	Ω
		V _{GS} = 10 V	I _D = 15 A, T _J = 125 °C	-	-	0.0019	
		V _{GS} = 10 V	I _D = 15 A, T _J = 175 °C	-	-	0.0023	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 70 A		-	190	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	5426	8150	pF
Output capacitance	C _{oss}			-	1533	2300	
Reverse transfer capacitance	C _{rss}			-	117	235	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 20 V, I _D = 40 A	-	86	129	nC
Gate-source charge ^c	Q _{gs}			-	29	-	
Gate-drain charge ^c	Q _{gd}			-	19	-	
Gate resistance	R _g	f = 1 MHz		0.8	1.6	2.4	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 0.5 Ω I _D ≅ 40 A, V _{GEN} = 10 V, R _g = 1 Ω		-	16	32	ns
Rise time ^c	t _r			-	18	36	
Turn-off delay time ^c	t _{d(off)}			-	35	70	
Fall time ^c	t _f			-	12	24	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed current ^a	I _{SM}			-	-	840	A
Forward voltage	V _{SD}	I _F = 15 A, V _{GS} = 0 V		-	-	1.1	V
Body diode reverse recovery time	t _{rr}	I _F = 10 A, di/dt = 100 A/μs		-	60	120	ns
Body diode reverse recovery charge	Q _{rr}			-	87	174	nC
Reverse recovery fall time	t _a			-	34	-	ns
Reverse recovery rise time	t _b			-	26	-	
Body diode peak reverse recovery current	I _{RM(REC)}			-	-2.5	-	A

Notes

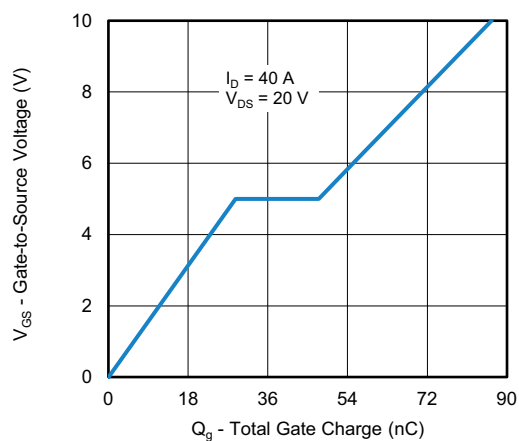
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

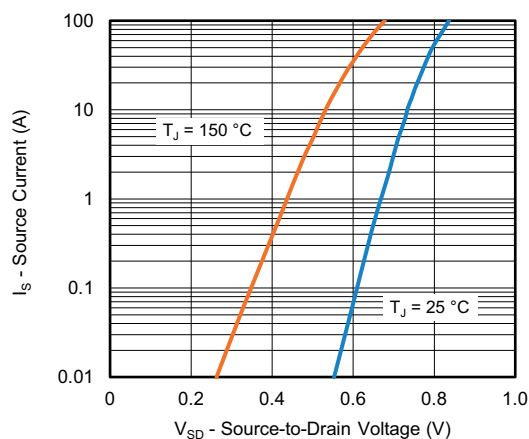
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transfer Characteristics

Capacitance

Transconductance

On-Resistance vs. Drain Current



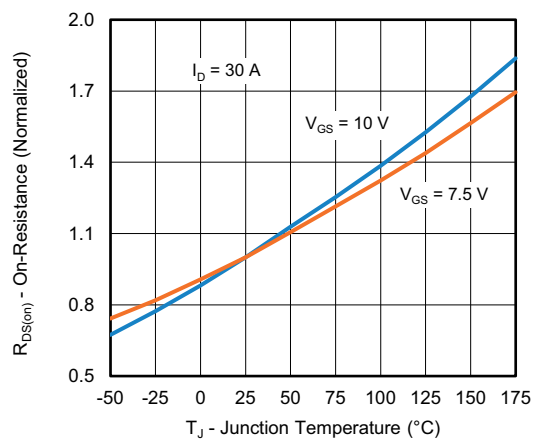
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



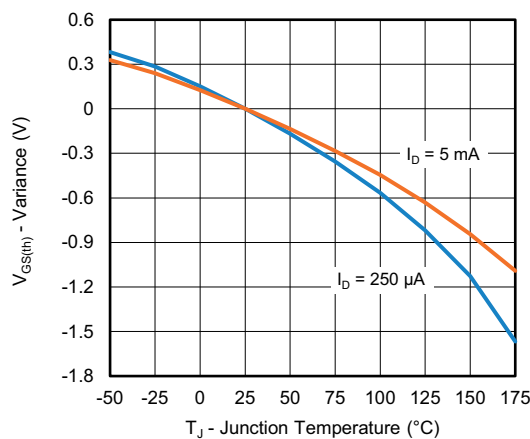
Gate Charge



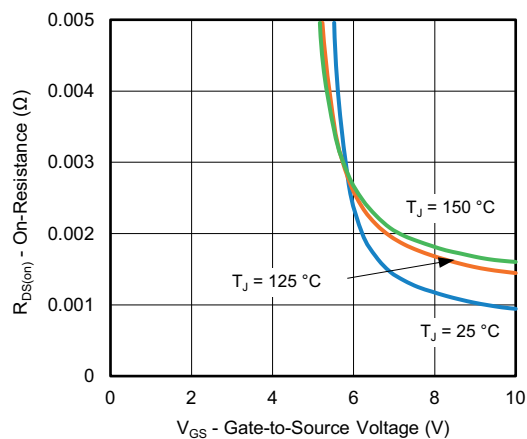
Source Drain Diode Forward Voltage



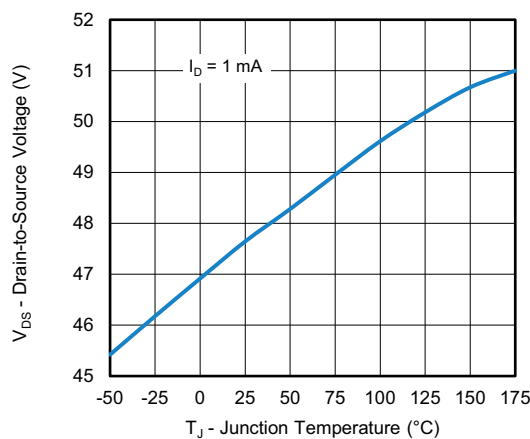
On-Resistance vs. Junction Temperature



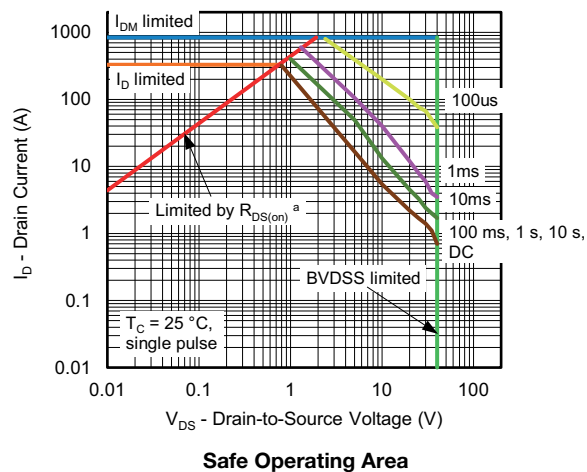
Threshold Voltage



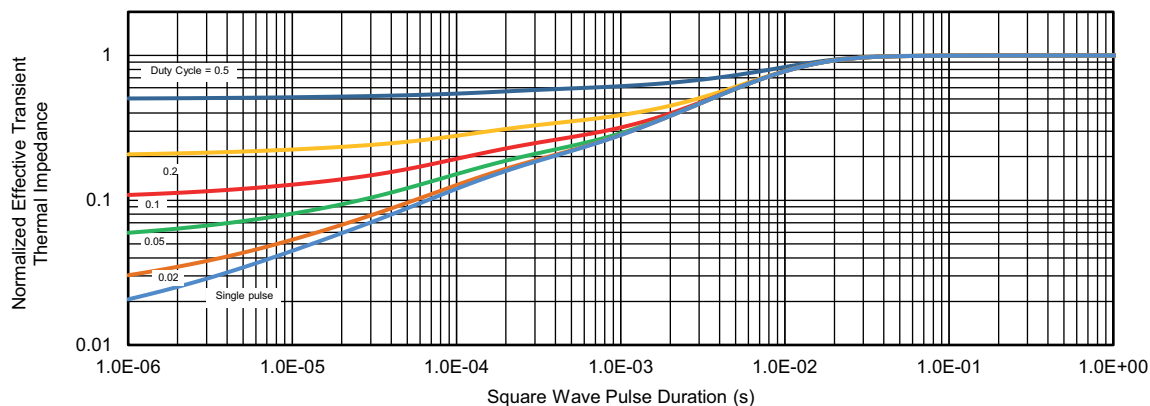
On-Resistance vs. Gate-to Source Voltage



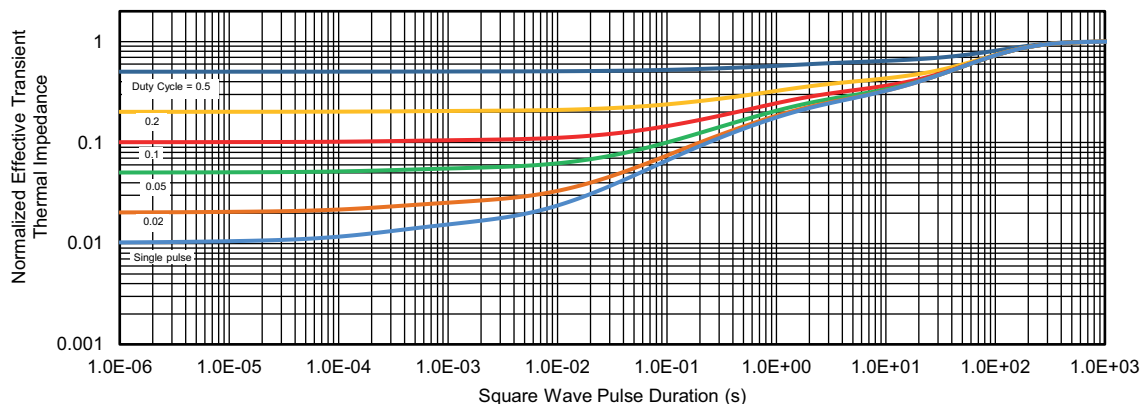
Drain Source Breakdown vs. Junction Temperature

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

Note

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



Normalized Thermal Transient Impedance, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Case (25 °C)
- are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions

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