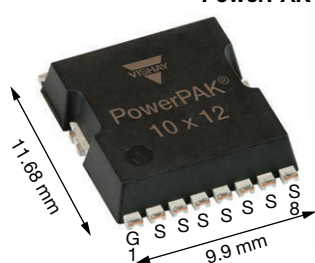
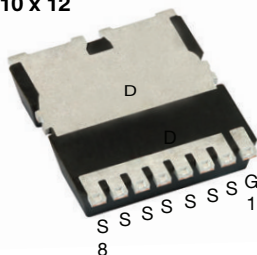


# N-Channel 40 V (D-S) MOSFET

**PowerPAK® 10 x 12**


Top View



Bottom View

## PRODUCT SUMMARY

$V_{DS}$ (V)	40
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 10$ V	0.00047
$Q_g$ typ. (nC)	312
$I_D$ (A) <sup>a</sup>	795
Configuration	Single

## FEATURES

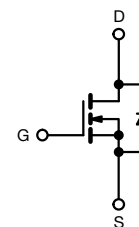
- TrenchFET® Gen V power MOSFET
- Leadership  $R_{DS(on)}$  minimizes power loss from conduction
- 100 %  $R_g$  and UIS tested
- Standard level FET
- Enhance power dissipation and lower  $R_{thJC}$
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

## APPLICATIONS

- Synchronous rectification
- Automation
- OR-ing and hot swap switch
- Power supplies
- Motor drive control
- Battery management



N-Channel MOSFET

## ORDERING INFORMATION

Package	PowerPAK® 10 x 12
Lead (Pb)-free and halogen-free	SiJK140E-T1-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	$V_{DS}$	40	V
Gate-source voltage	$V_{GS}$	$\pm 20$	
Continuous drain current ( $T_J = 175$ °C)	$T_C = 25$ °C	795	A
	$T_C = 100$ °C	562	
	$T_A = 25$ °C	140 <sup>b, c</sup>	
	$T_A = 100$ °C	99 <sup>b, c</sup>	
Pulsed drain current ( $t = 100$ $\mu$ s)	$I_{DM}$	900	
Continuous source-drain diode current	$T_C = 25$ °C	487	
	$T_A = 25$ °C	15 <sup>b, c</sup>	
Single pulse avalanche current	$I_{AS}$	100	
Single pulse avalanche energy	$E_{AS}$	500	mJ
Maximum power dissipation	$T_C = 25$ °C	536	W
	$T_C = 100$ °C	268	
	$T_A = 25$ °C	17 <sup>b, c</sup>	
	$T_A = 100$ °C	8.3 <sup>b, c</sup>	
Operating junction and storage temperature range	$T_J, T_{stg}$	-55 to +175	°C
Soldering recommendations (peak temperature) <sup>c</sup>		260	

## THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient <sup>b</sup>	$R_{thJA}$	6.3	9	°C/W
Maximum junction-to-case (drain)	$R_{thJC}$	0.21	0.28	

### Notes

- $T_C = 25$  °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$  s
- See solder profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). The PowerPAK 10 x 12 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 conditions is 39 °C/W



SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	40	-	-	V
V <sub>DS</sub> temperature coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = 10 mA	-	22	-	mV/°C
V <sub>GS(th)</sub> temperature coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA	-	-8.7	-	
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.4	-	3.5	V
Gate-source leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V	-	-	1	μA
		V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C	-	-	10	
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	0.00034	0.00047	Ω
Forward transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 25 V, I <sub>D</sub> = 100 A	-	450	-	S
Dynamic <sup>b</sup>						
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	18 510	-	pF
Output capacitance	C <sub>oss</sub>		-	8540	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	555	-	
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	312	470	nC
Gate-source charge	Q <sub>gs</sub>		-	84	-	
Gate-drain charge	Q <sub>gd</sub>		-	70	-	
Output charge	Q <sub>oss</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V	-	220	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz	0.22	1.1	2.2	Ω
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 20 V, R <sub>L</sub> = 4 Ω, I <sub>D</sub> ≅ 10 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω	-	40	80	ns
Rise time	t <sub>r</sub>		-	45	90	
Turn-off delay time	t <sub>d(off)</sub>		-	85	170	
Fall time	t <sub>f</sub>		-	45	90	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	-	-	487	A
Pulse diode forward current	I <sub>SM</sub>		-	-	900	
Body diode voltage	V <sub>SD</sub>	I <sub>S</sub> = 10 A, V <sub>GS</sub> = 0 V	-	0.7	1.1	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 10 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C	-	105	210	ns
Body diode reverse recovery charge	Q <sub>rr</sub>		-	310	620	nC
Reverse recovery fall time	t <sub>a</sub>		-	64	-	ns
Reverse recovery rise time	t <sub>b</sub>		-	41	-	

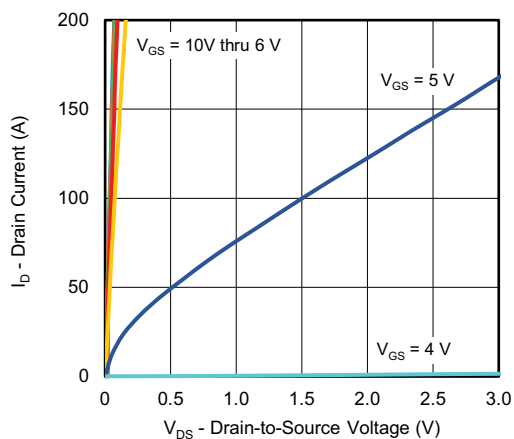
**Notes**

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

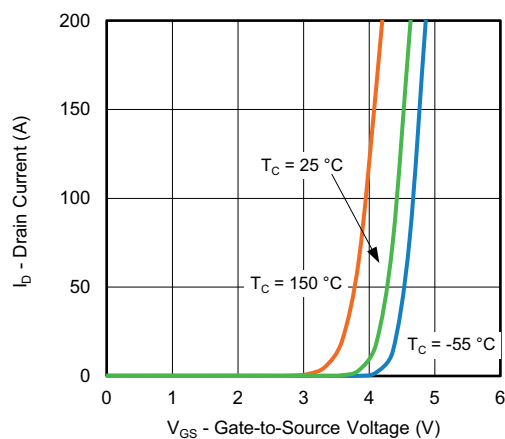
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



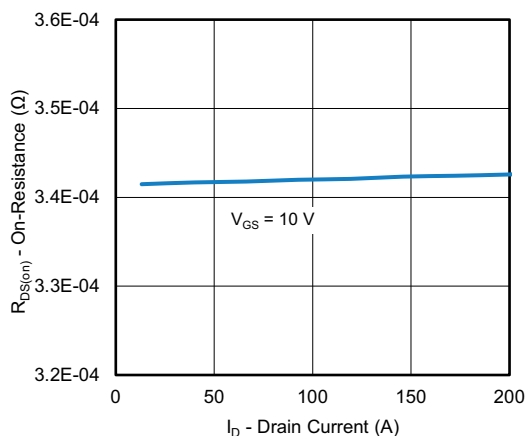
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



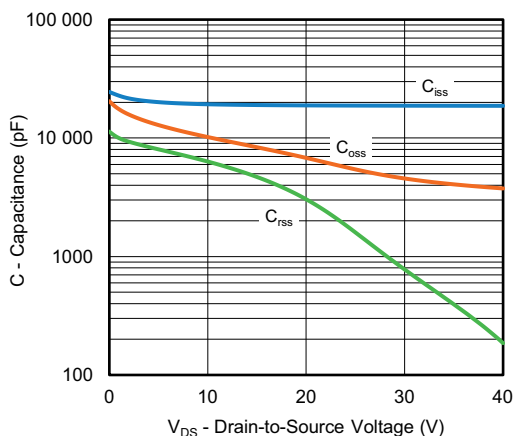
**Output Characteristics**



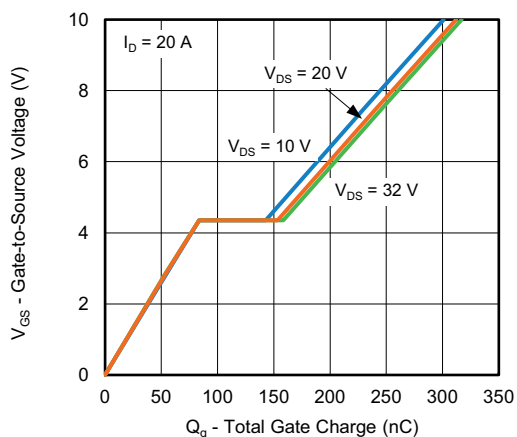
**Transfer Characteristics**



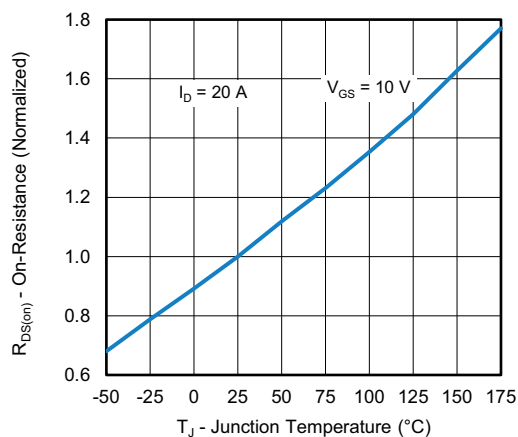
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**



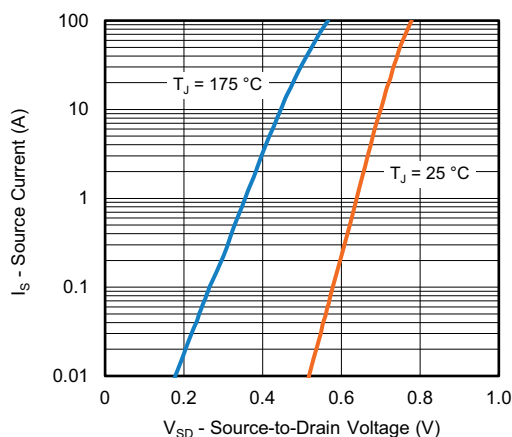
**Gate Charge**



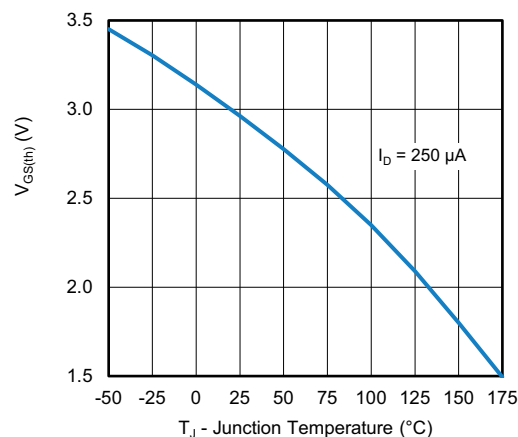
**On-Resistance vs. Junction Temperature**



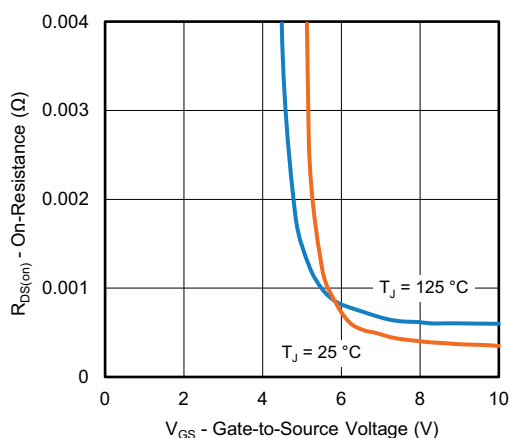
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



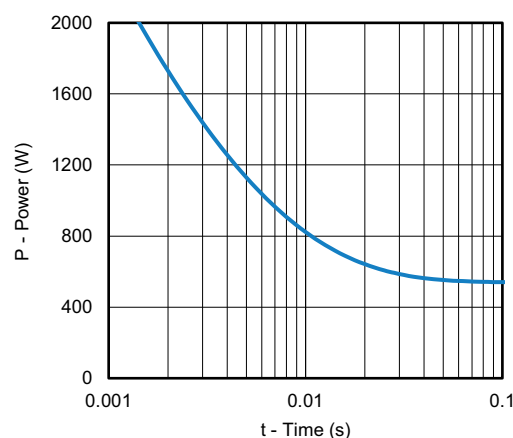
**Source-Drain Diode Forward Voltage**



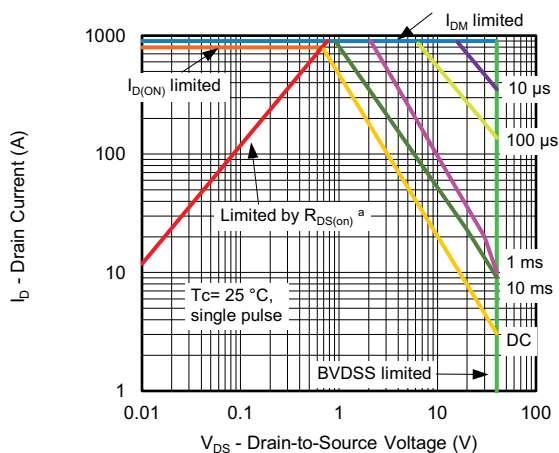
**Threshold Voltage**



**On-Resistance vs. Gate-to-Source Voltage**



**Single Pulse Power, Junction-to-Case**



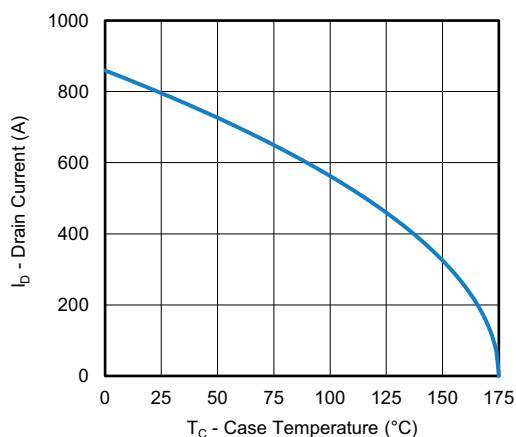
**Safe Operating Area, Junction-to-Ambient**

**Note**

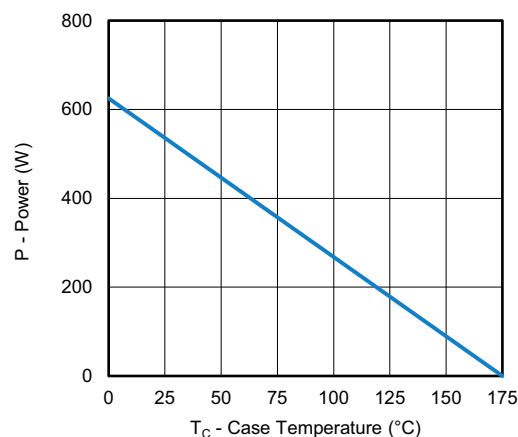
a.  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified



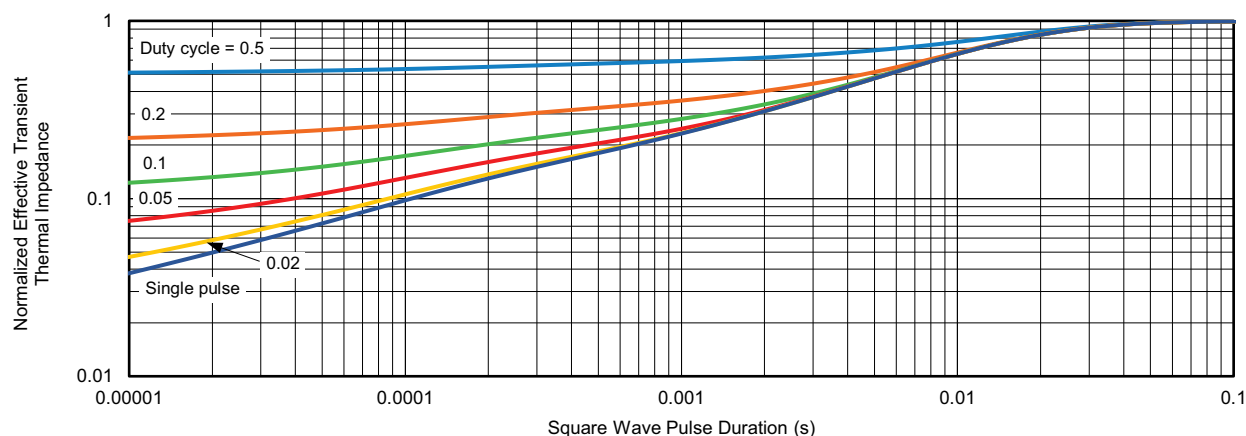
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Current Derating <sup>a</sup>**



**Power, Junction-to-Case**



**Normalized Thermal Transient Impedance, Junction-to-Case**

**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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