

## P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
-60	0.065 @ $V_{GS} = -10$ V	-5.7
	0.110 @ $V_{GS} = -4.5$ V	-4.4

### FEATURES

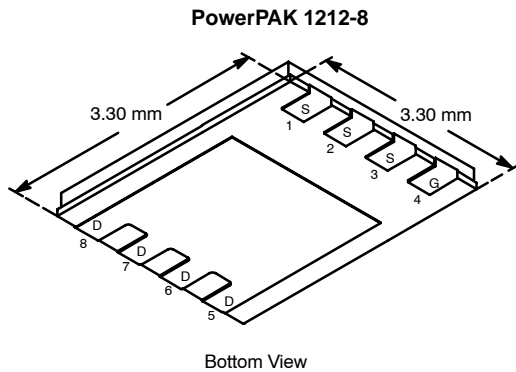
- TrenchFET® Power MOSFET
- New PowerPAK® Package
  - Low Thermal Resistance,  $R_{thJC}$
  - Low 1.07-mm Profile
- Fast Switching



**RoHS**  
COMPLIANT  
Available

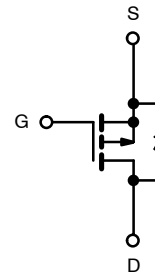
### APPLICATIONS

- Load Switches
- Half-Bridge Motor Drives
- High voltage Non-Synchronous Buck Converters



Bottom View

Ordering Information: Si7415DN-T1  
Si7415DN-T1—E3 (Lead (Pb)-Free)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	10 secs	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	-60		V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$			
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>	$I_D$	$T_A = 25^\circ\text{C}$	-5.7	-3.6	A
		$T_A = 70^\circ\text{C}$	-4.6	-2.9	
Pulsed Drain Current	$I_{DM}$	-30			
continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	-3.2	-1.3		
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25^\circ\text{C}$	3.8	1.5	W
		$T_A = 70^\circ\text{C}$	2.0	0.8	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ\text{C}$	
Soldering Recommendations (Peak Temperature) <sup>b,c</sup>		260			

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	$t \leq 10$ sec	26	33	$^\circ\text{C/W}$
		Steady State	65	81	
Maximum Junction-to-Case (Drain)	$R_{thJC}$	1.9	2.4		

**Notes**

- Surface Mounted on 1" x 1" FR4 Board.
- See Solder Profile (<http://www.vishay.com/doc?73257>). The PowerPAK 1212-8 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.

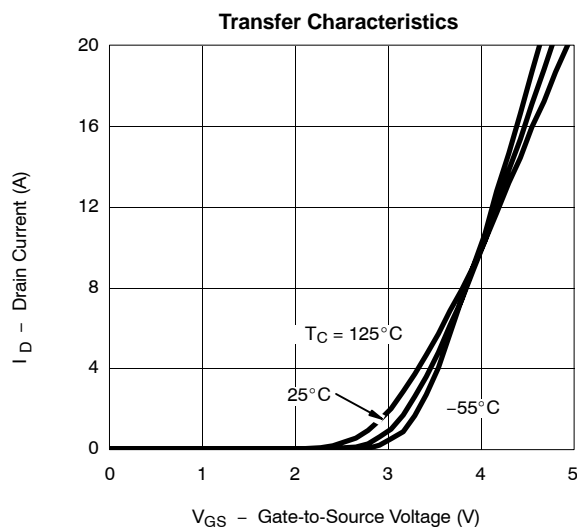
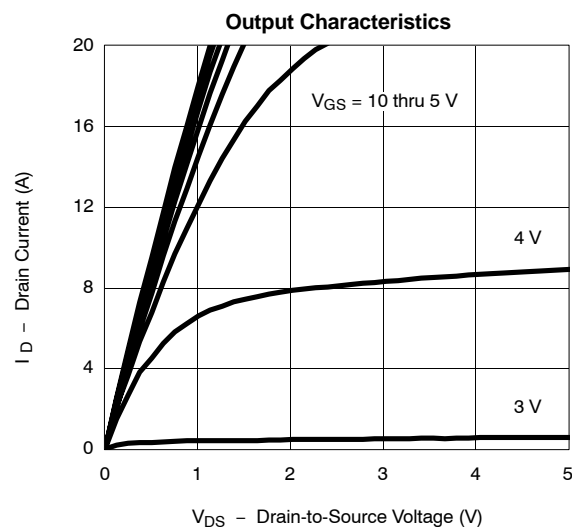
**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-1		-3	V
Gate-Body 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> = -60 V, V <sub>GS</sub> = 0 V			-1	μA
		V <sub>DS</sub> = -60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70 °C			-5	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≤ -5 V, V <sub>GS</sub> = -10 V	-20			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -5.7 A		0.054	0.065	Ω
		V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -4.4 A		0.090	0.110	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -15 V, I <sub>D</sub> = -5.7 A		11		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = -3.2 A, V <sub>GS</sub> = 0 V		-0.8	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -5.7 A		15	25	nC
Gate-Source Charge	Q <sub>gs</sub>			4		
Gate-Drain Charge	Q <sub>gd</sub>			3.2		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -30 V, R <sub>L</sub> = 30 Ω I <sub>D</sub> ≅ -1 A, V <sub>GEN</sub> = -10 V, R <sub>g</sub> = 6 Ω		12	20	ns
Rise Time	t <sub>r</sub>			12	20	
Turn-Off Delay Time	t <sub>d(off)</sub>			22	35	
Fall Time	t <sub>f</sub>			16	25	
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = -3.2 A, di/dt = 100 A/μs		45	90	

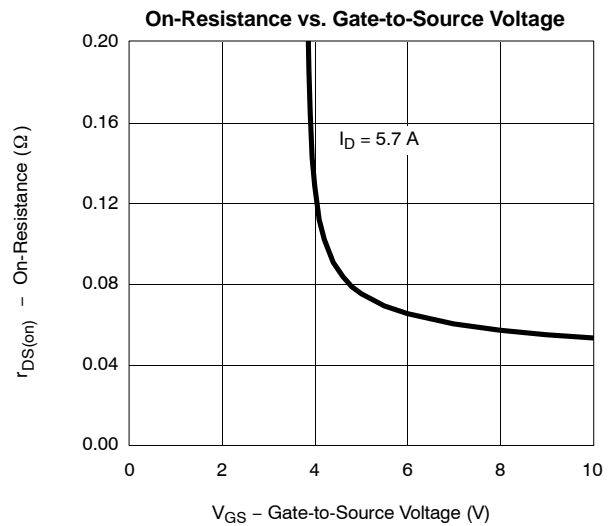
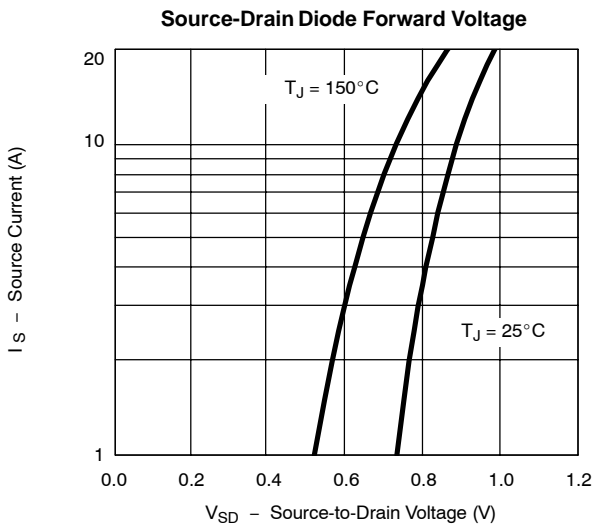
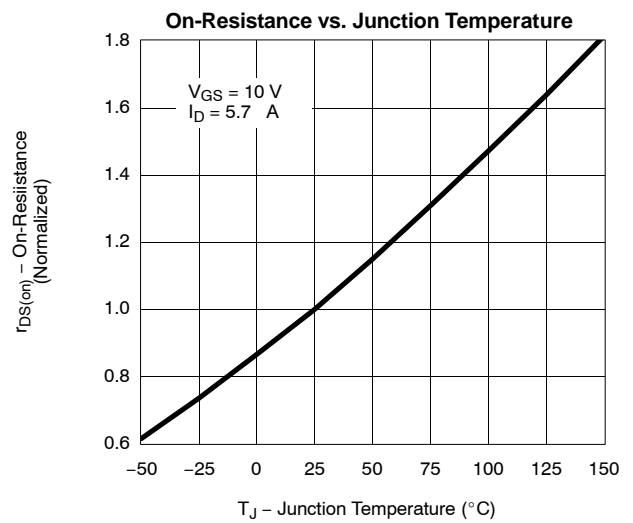
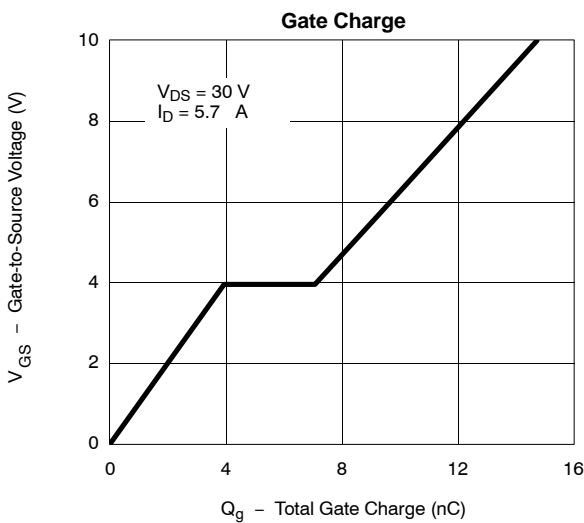
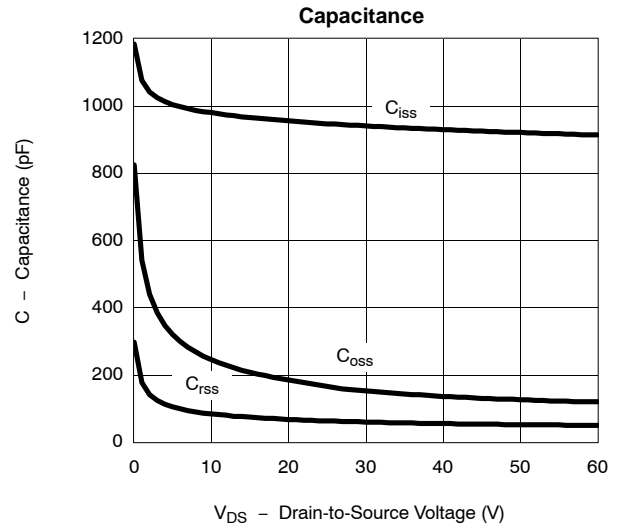
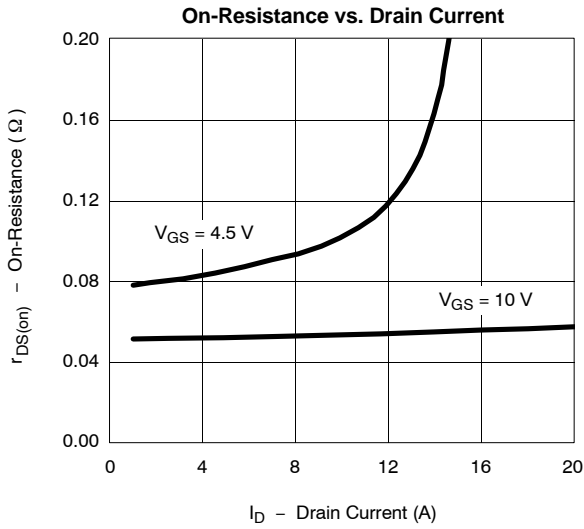
## Notes

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

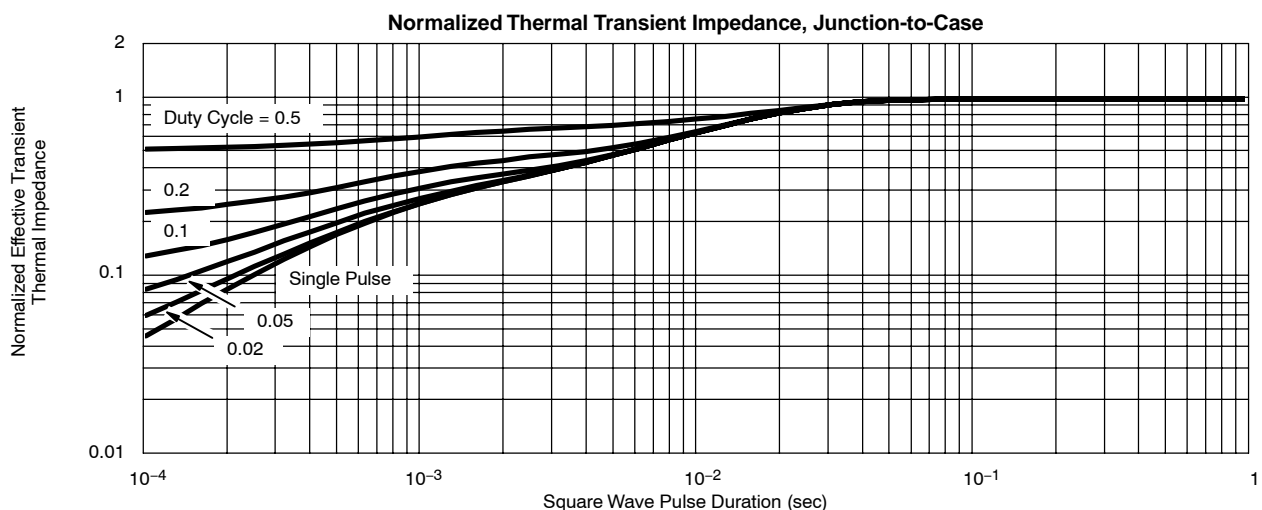
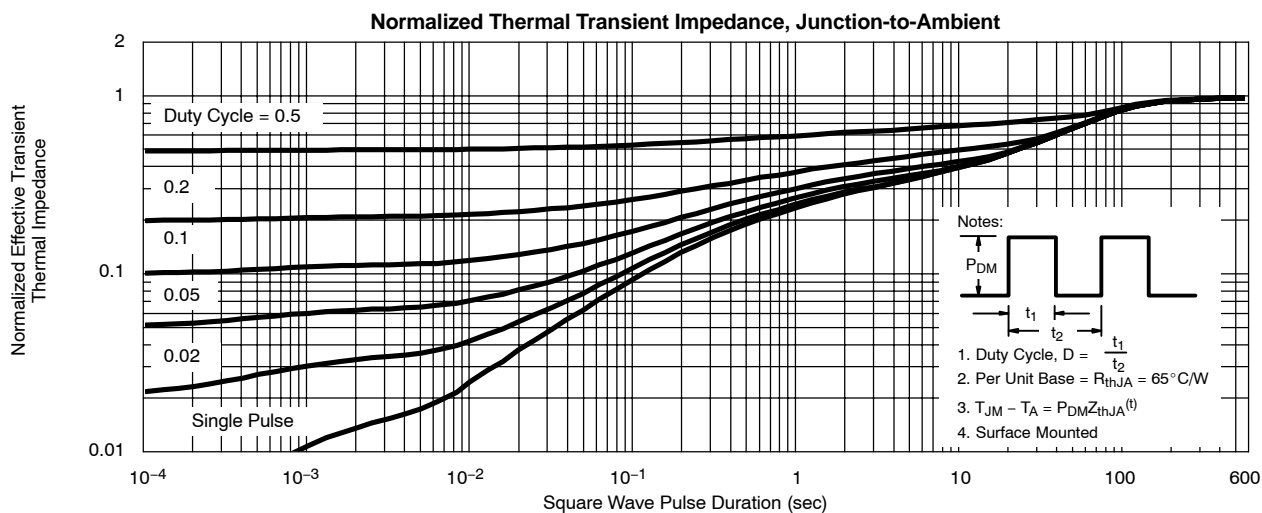
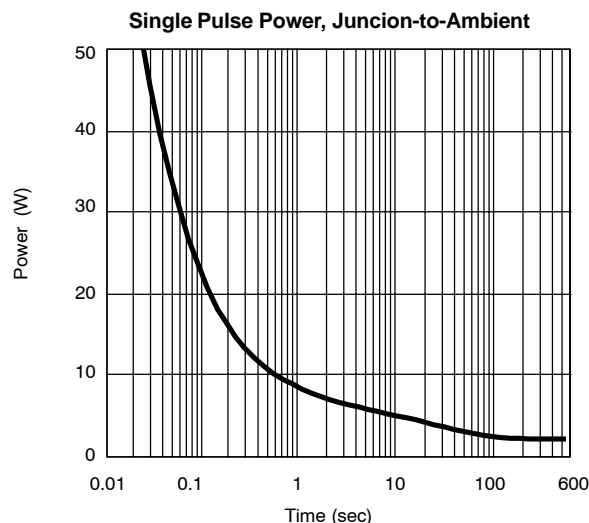
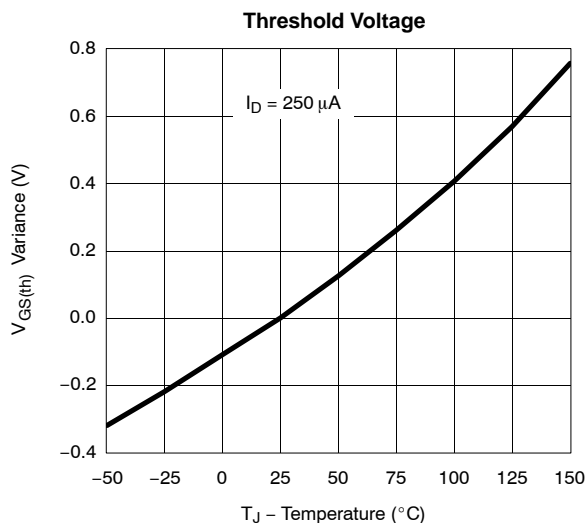
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

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