

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

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
60	0.025 at V <sub>GS</sub> = 10 V	8.7
	0.036 at V <sub>GS</sub> = 4.5 V	7.3

### FEATURES

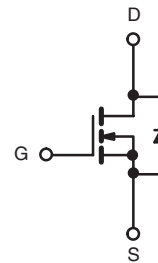
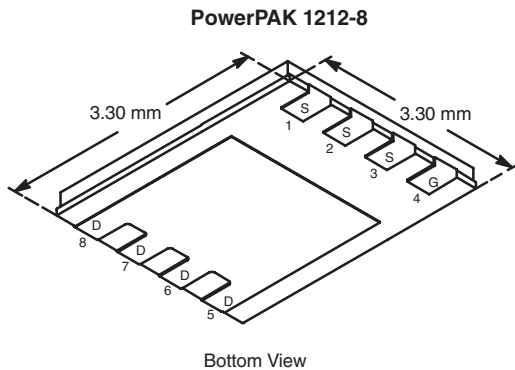
- TrenchFET<sup>®</sup> Power MOSFET
- New Low Thermal Resistance
- PowerPAK<sup>®</sup> 1212-8 Package with Low 1.07-mm Profile
- PWM Optimized



Available  
**RoHS\***  
COMPLIANT

### APPLICATIONS

- Primary Side Switch
- Synchronous Rectifier
- Motor Drives



N-Channel MOSFET

**Ordering Information:** Si7414DN-T1  
Si7414DN-T1-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted				
Parameter	Symbol	10 secs	Steady State	Unit
Drain-Source Voltage	V <sub>DS</sub>	60		V
Gate-Source Voltage	V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	8.7	5.6
		T <sub>A</sub> = 70 °C	7.0	4.4
Pulsed Drain Current	I <sub>DM</sub>	30		A
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	3.2	1.3	
Single Avalanche Current	I <sub>AS</sub>	L = 0.1 mH	19	
Single Avalanche Energy (Duty Cycle 1 %)			E <sub>AS</sub>	18
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	3.8	1.5
		T <sub>A</sub> = 70 °C	2.0	0.8
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C
Soldering Recommendations <sup>b,c</sup>		260		

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	t ≤ 10 sec	26	33
		Steady State	65	81
Maximum Junction-to-Case	R <sub>thJC</sub>	1.9	2.4	°C/W

**Notes**

- a. Surface Mounted on 1" x 1" FR4 Board.  
b. See Solder Profile (<http://www.vishay.com/ppg?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.  
c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

\* Pb containing terminations are not RoHS compliant, exemptions may apply



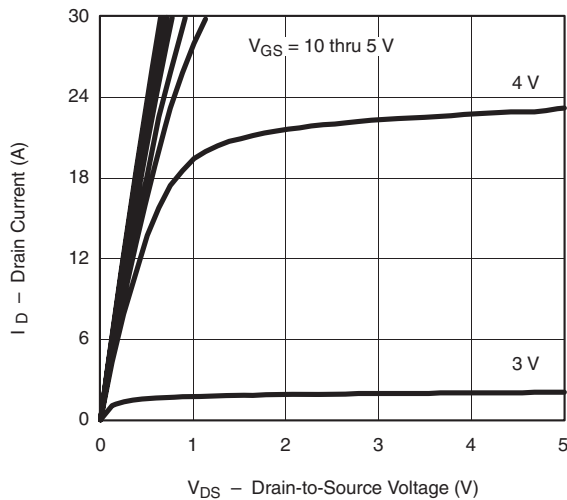
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	30			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 8.7\text{ A}$		0.021	0.025	$\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 7.3\text{ A}$		0.030	0.036	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 8.7\text{ A}$		18		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 3.2\text{ A}, V_{GS} = 0\text{ V}$		0.75	1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 8.7\text{ A}$		16	25	nC
Gate-Source Charge	$Q_{gs}$			2.7		
Gate-Drain Charge	$Q_{gd}$			4.4		
Gate Resistance	$R_g$			1.0		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 30\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$		15	25	ns
Rise Time	$t_r$			12	20	
Turn-Off Delay Time	$t_{d(off)}$			30	50	
Fall Time	$t_f$			12	20	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 3.2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		45	90	

Notes

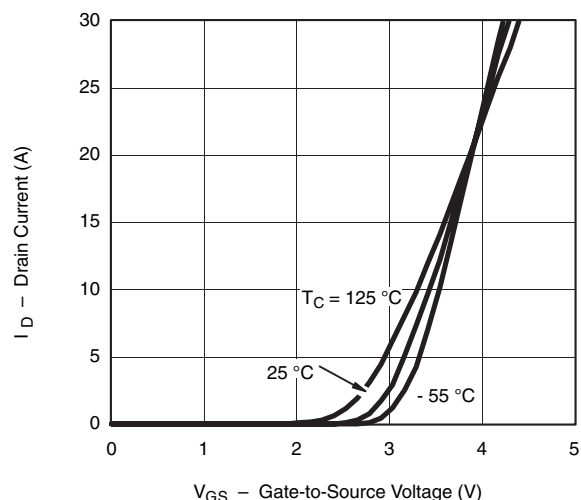
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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**  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted

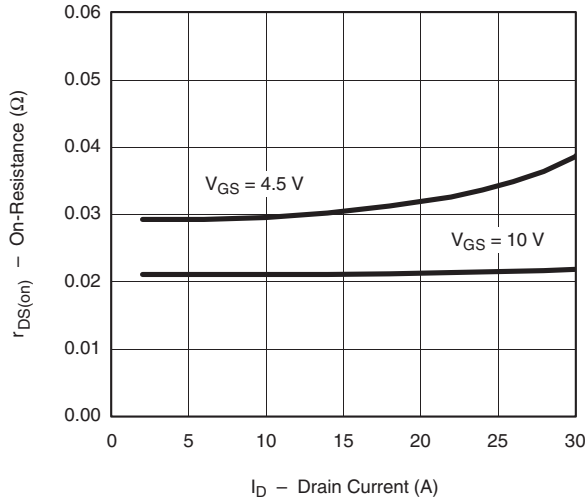


**Output Characteristics**

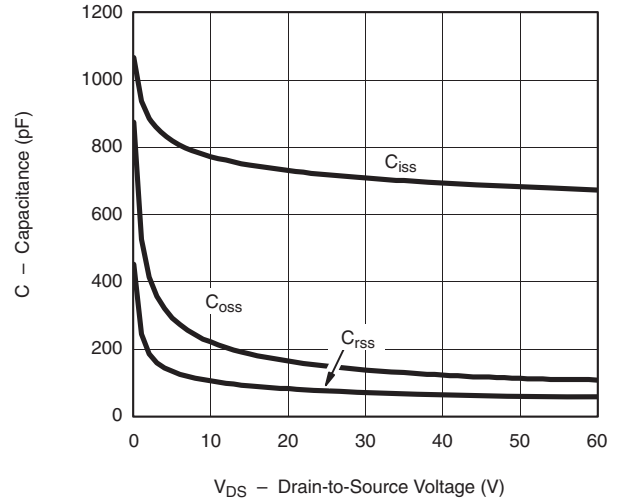


**Transfer Characteristics**

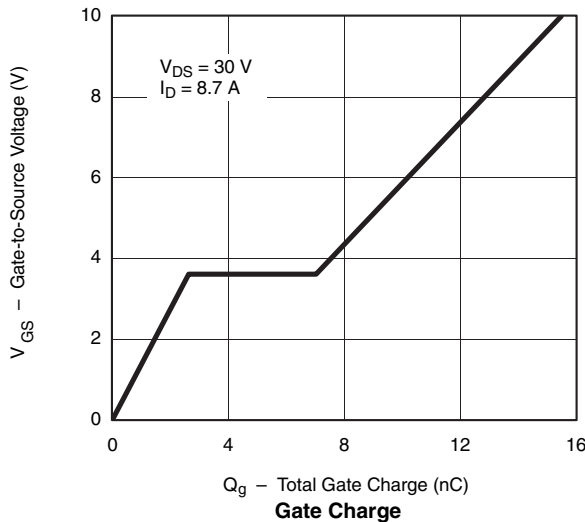
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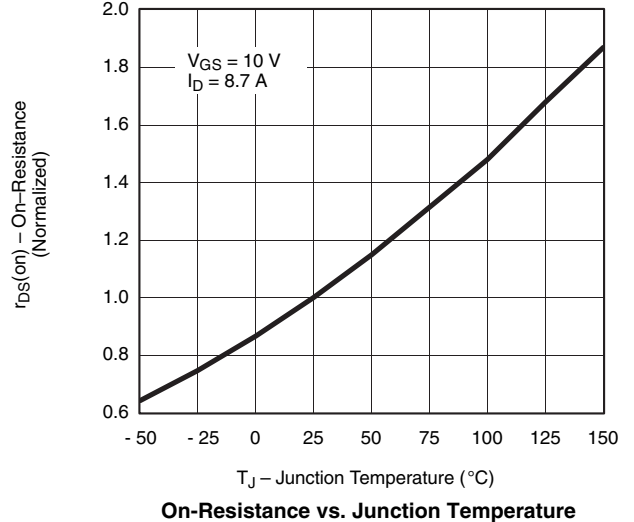
**On-Resistance vs. Drain Current**



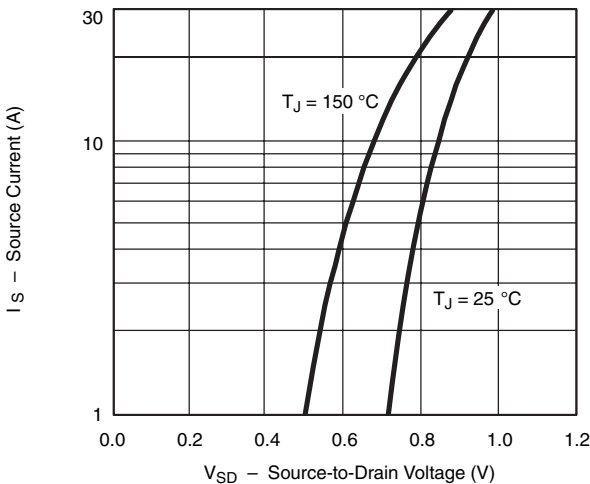
**Capacitance**



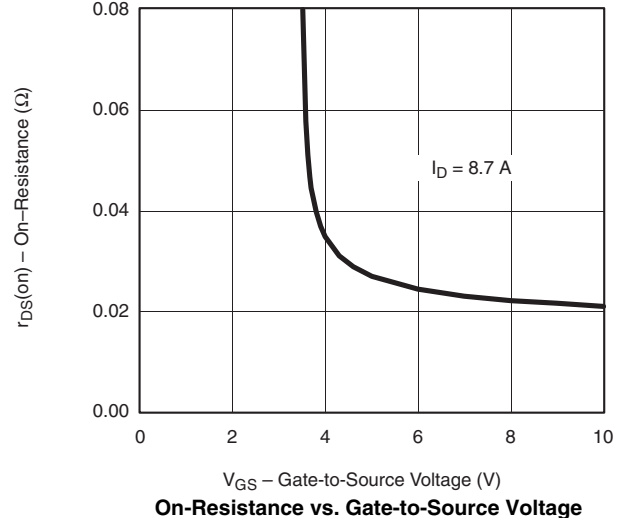
**Gate Charge**



**On-Resistance vs. Junction Temperature**

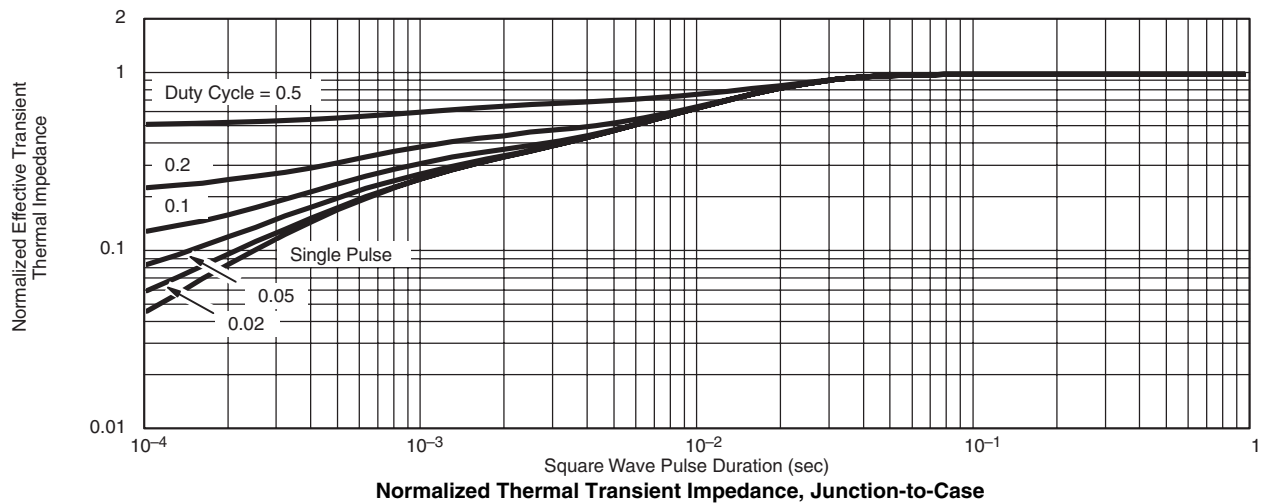
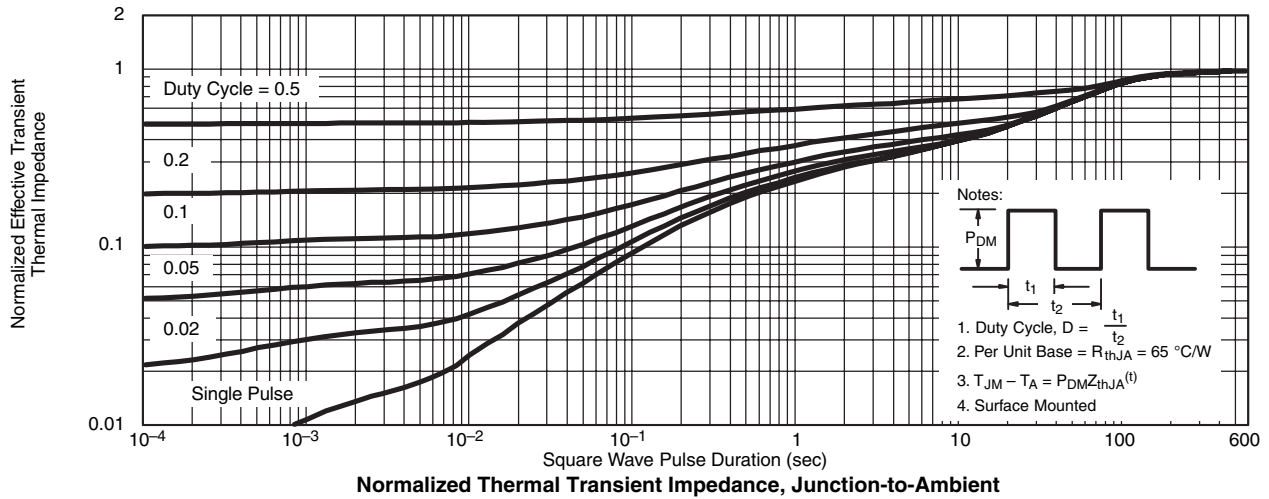
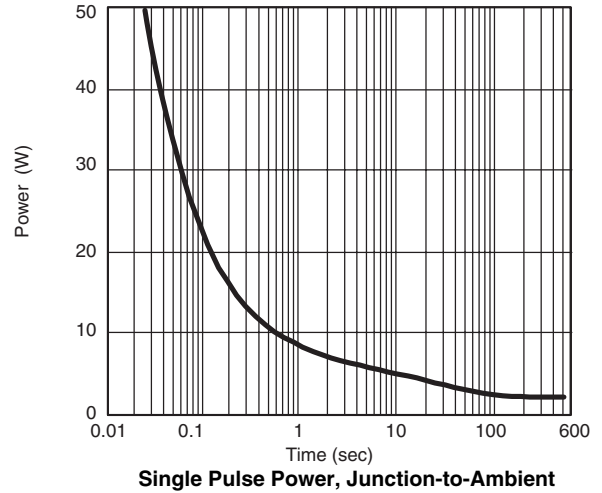
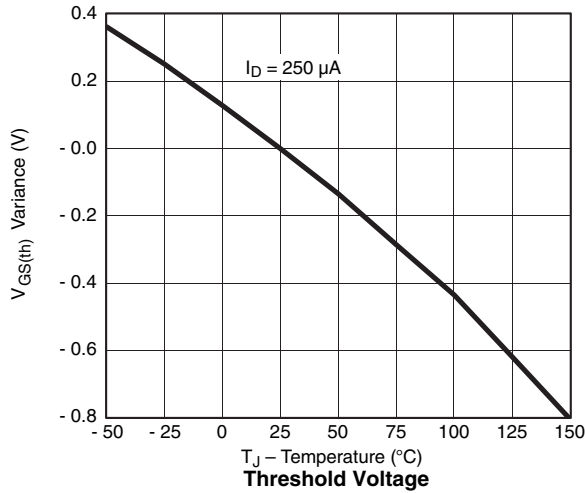


**Source-Drain Diode Forward Voltage**



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

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



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