N-Channel 200 V (D-S) MOSFET

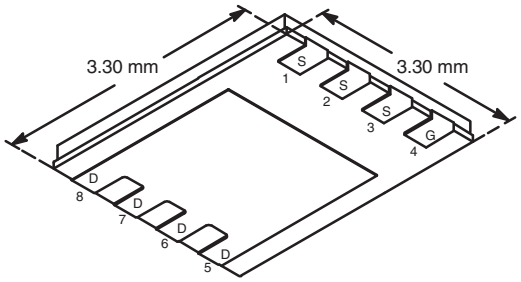
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
200	0.240 at V_{GS} = 10 V	2.6	12.1
	0.250 at V_{GS} = 6 V	2.5	

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- PWM-Optimized TrenchFET® Power MOSFET
- 100 % R_g Tested
- Avalanche Tested
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

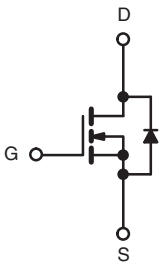
PowerPAK® 1212-8



Bottom View

APPLICATIONS

- Primary Side Switch
  - Telecom Power Supplies
  - Distributed Power Architectures
  - Miniature Power Modules



N-Channel MOSFET

Ordering Information: Si7820DN-T1-E3 (Lead (Pb)-free)
Si7820DN-T1-GE3 (Lead (Pb)-free and Halogen-free)

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

Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	200		V
Gate-Source Voltage		V_{GS}	± 20		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	2.6	1.7	A
	T_A = 70 °C		2.1	1.3	
Pulsed Drain Current		I_{DM}	10		
Continuous Source Current (Diode Conduction)[a]		I_S	3.2	1.3	
Single Avalanche Current	L = 0 1 mH	I_{AS}	3.5		
Single Avalanche Energy		E_{AS}	0.6		mJ
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	3.8	1.5	W
	T_A = 70 °C		2.0	0.8	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature)[b, c]			260		

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a]	t ≤ 10 s	R_{thJA}	26	33	°C/W
	Steady State		65	81	
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.9	2.4	

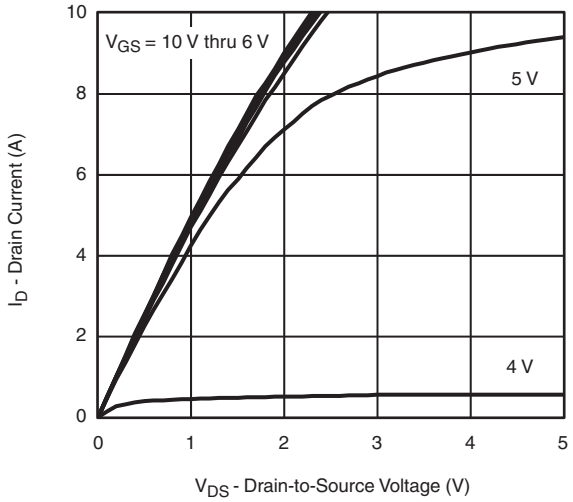
Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. See solder profile (www.vishay.com/ppg?73257). The PowerPAK 1212-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot 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.

MOSFET SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2		4	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 200 V, V_{GS} = 0 V			1	µA
		V_{DS} = 200 V, V_{GS} = 0 V, T_J = 55 °C			5	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	10			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 2.6 A		0.200	0.240	Ω
		V_{GS} = 6 V, I_D = 2.5 A		0.210	0.250	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 2.6 A		8		S
Diode Forward Voltage[a]	V_{SD}	I_S = 3.2 A, V_{GS} = 0 V		0.78	1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = 100 V, V_{GS} = 10 V, I_D = 2.6 A		12.1	18	nC
Gate-Source Charge	Q_{gs}			2.5		
Gate-Drain Charge	Q_{gd}			4.1		
Gate Resistance	R_g	f = 1 MHz	0.5	2.3	3.9	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 100 V, R_L = 100 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_g = 6 Ω		11	20	ns
Rise Time	t_r			12	20	
Turn-Off Delay Time	$t_{d(off)}$			30	45	
Fall Time	t_f			17	30	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 3.2 A, dI/dt = 100 A/µs		65	100	

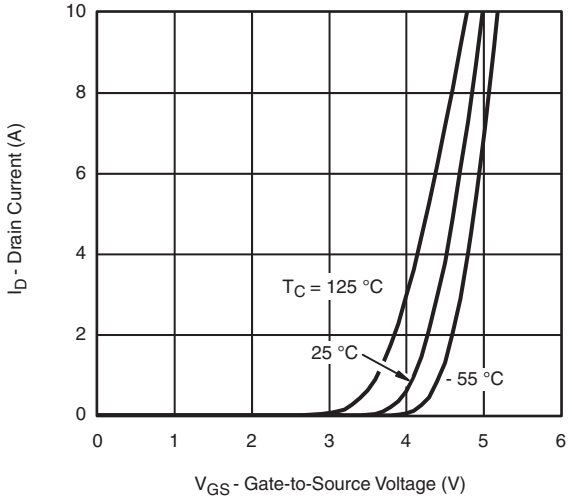
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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 otherwise noted)

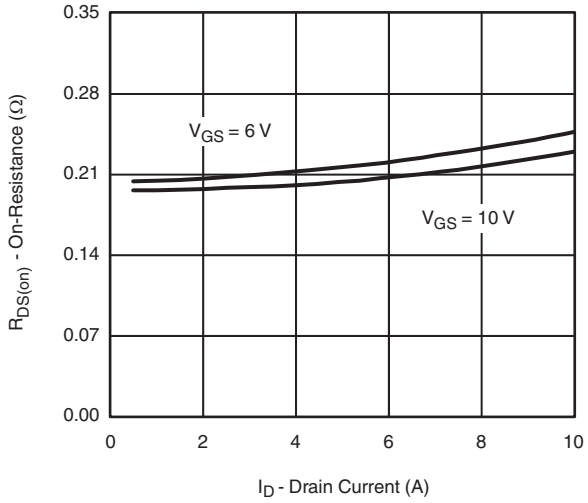


Output Characteristics

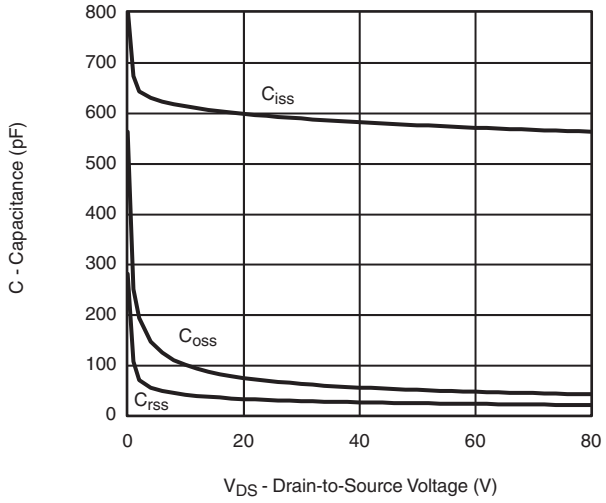


Transfer Characteristics

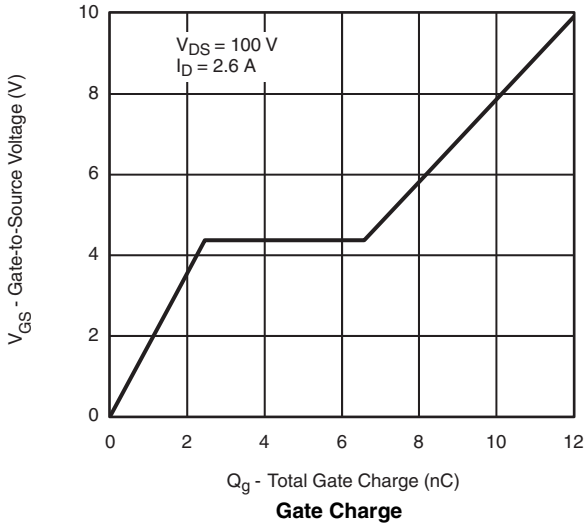
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



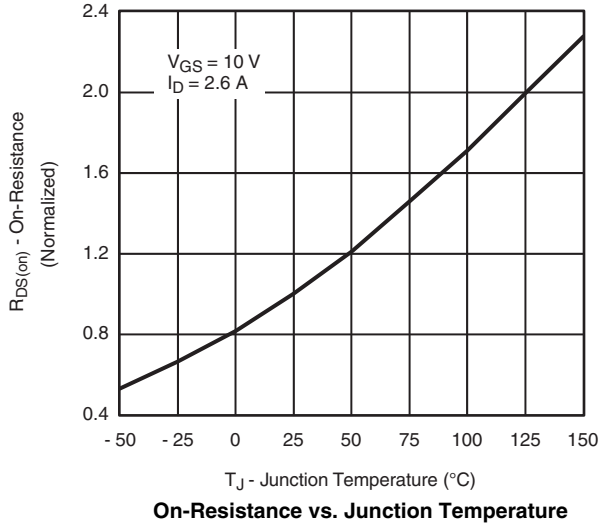
On-Resistance vs. Drain Current



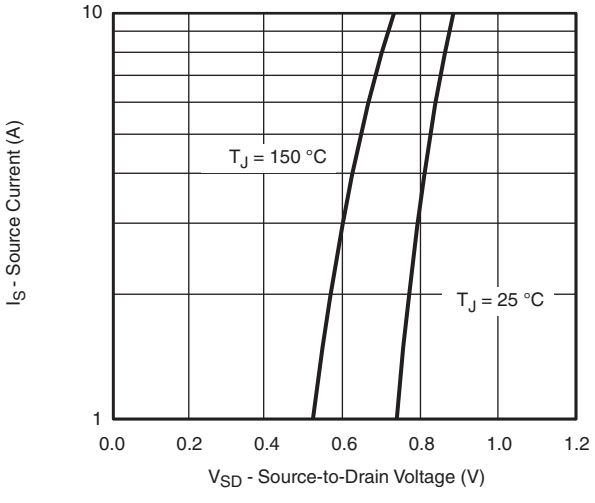
Capacitance



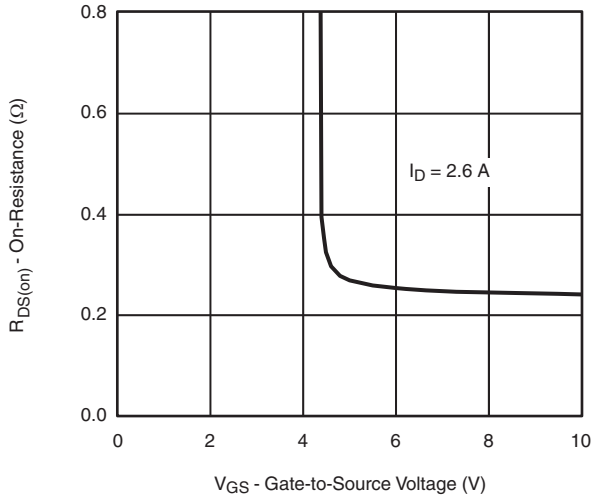
Gate Charge



On-Resistance vs. Junction Temperature

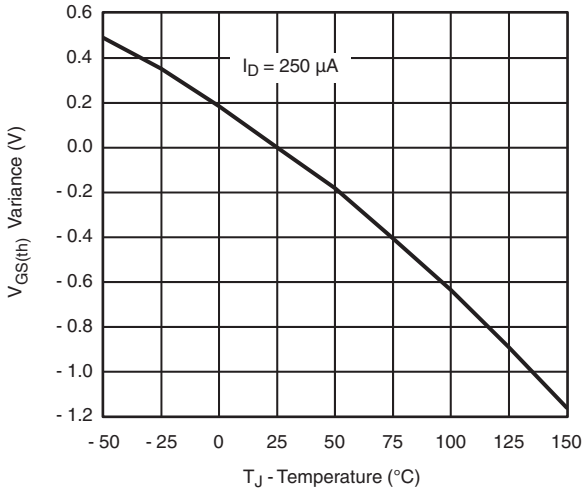


Source-Drain Diode Forward Voltage

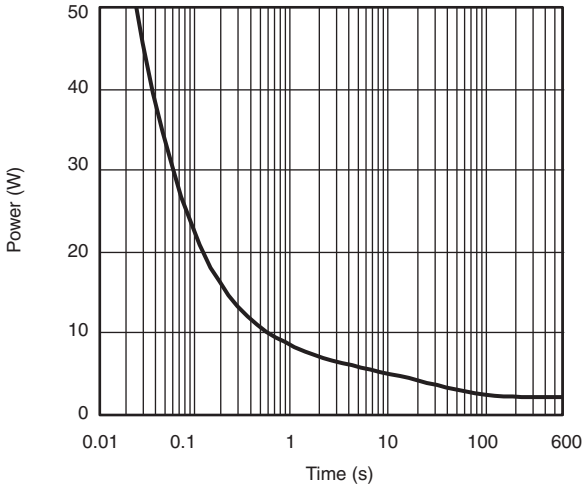


On-Resistance vs. Gate-to-Source Voltage

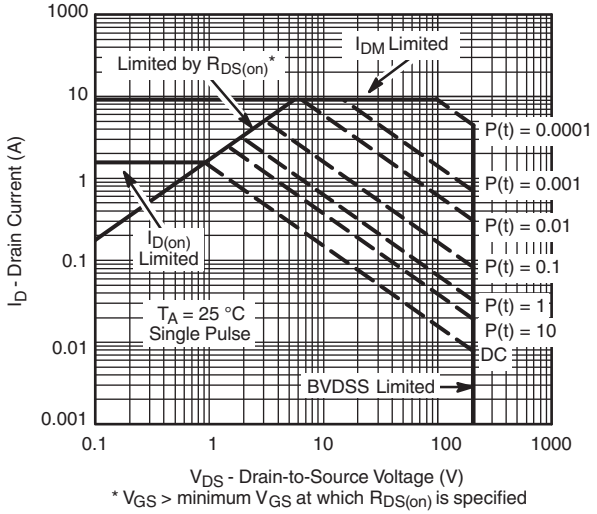
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



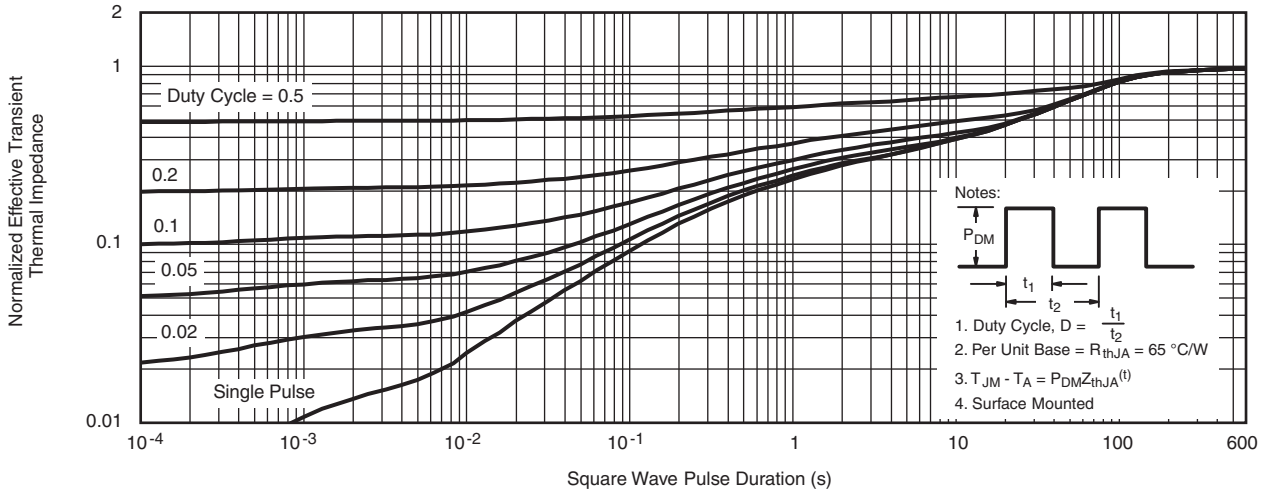
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

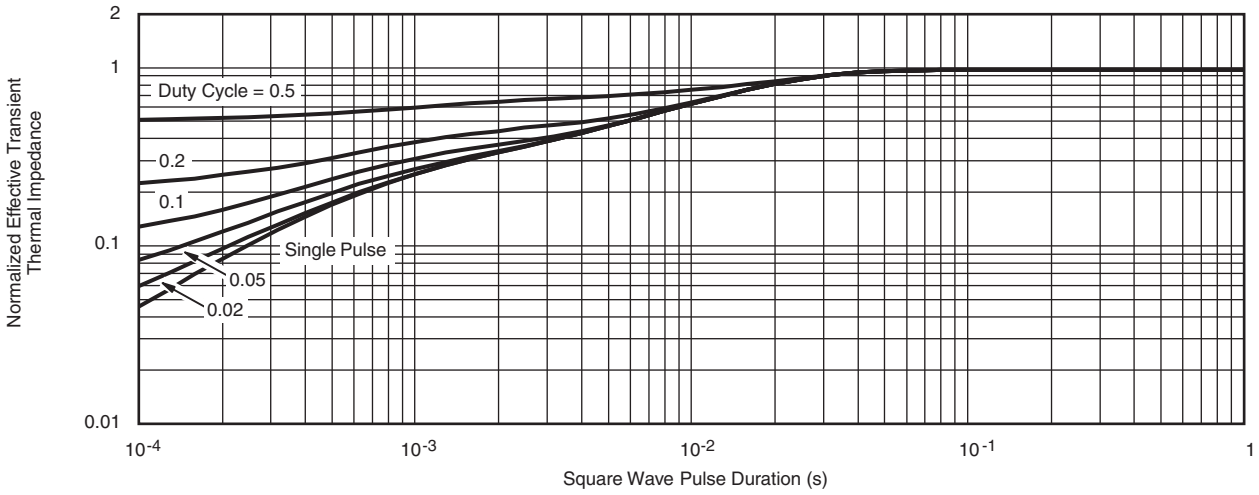


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

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