N-Channel 30-V (D-S) Fast Switching MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
30	0.011 at V_{GS} = 10 V	14.4
	0.0175 at V_{GS} = 4.5 V	12.6

FEATURES

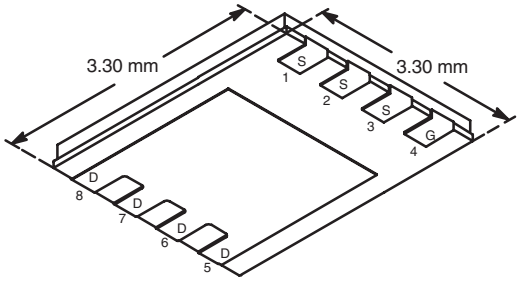
- TrenchFET® Power MOSFET
- PWM Optimized
- New Low Thermal Resistance PowerPAK® Package with Low 1.07-mm Profile

Available
RoHS* COMPLIANT

APPLICATIONS

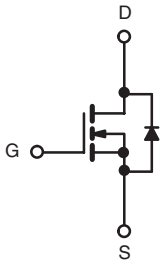
- DC/DC Converters
  - Secondary Synchronous Rectifier
  - High–Side MOSFET in Synchronous Buck

PowerPAK 1212-8



Bottom View

Ordering Information: Si7806DN-T1
Si7806DN–T1–E3 (Lead (Pb)–free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted					
Parameter		Symbol	10 secs	Steady State	Unit
Drain-Source Voltage		V_{DS}	30		V
Gate-Source Voltage		V_{GS}	± 20		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	14.4	9.2	A
	T_A = 70 °C		11.6	7.4	
Pulsed Drain Current		I_{DM}	40		
Continuous Source Current (Diode Conduction)[a]		I_S	3.2	1.3	
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[b,c]			260		

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a]	t ≤ 10 sec	R_{thJA}	24	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 (*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.

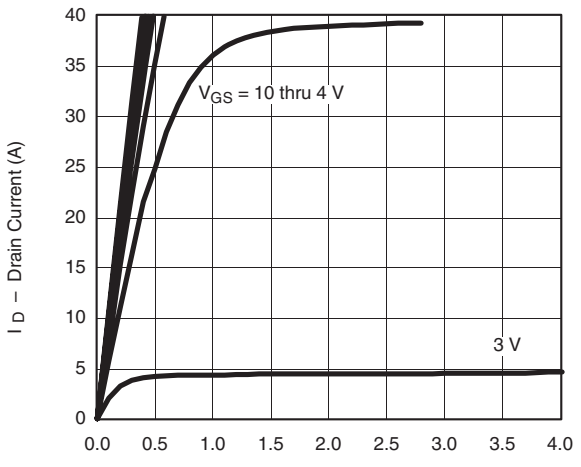
* Pb containing terminations are not RoHS compliant, exemptions may apply

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typ**	**Max**	**Unit**
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.0		3	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} = 30 V, V_{GS} = 0 V			1	µA
		V_{DS} = 30 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	40			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 14.4 A		0.009	0.011	Ω
		V_{GS} = 4.5 V, I_D = 12.6 A		0.0145	0.0175	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 14.4 A		34		S
Diode Forward Voltage[a]	V_{SD}	I_S = 3.2 A, V_{GS} = 0 V		0.77	1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 14.4 A		8.5	11	nC
	Q_{gt}	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 14.4 A		19	24	
Gate-Source Charge	Q_{gs}			3.6		
Gate-Drain Charge	Q_{gd}			3.0		
Gate Resistance	R_g		1	2	3.4	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 15 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_G = 6 Ω		8	15	ns
Rise Time	t_r			12	20	
Turn-Off DelayTime	$t_{d(off)}$			25	40	
Fall Time	t_f			10	20	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 3.2 A, di/dt = 100 A/µs		35	70	

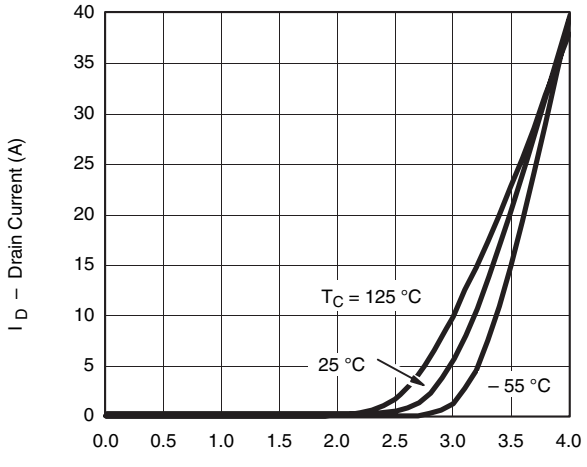
Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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 T_A = 25 °C, unless otherwise noted

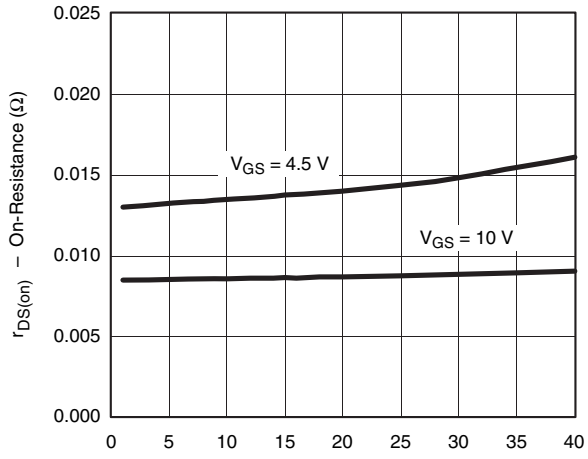


Output Characteristics

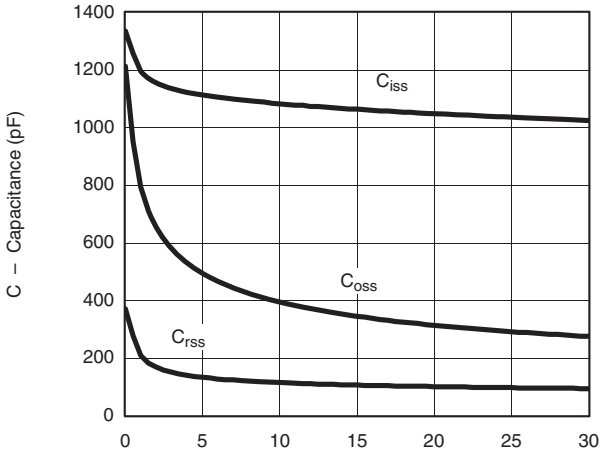


Transfer Characteristics

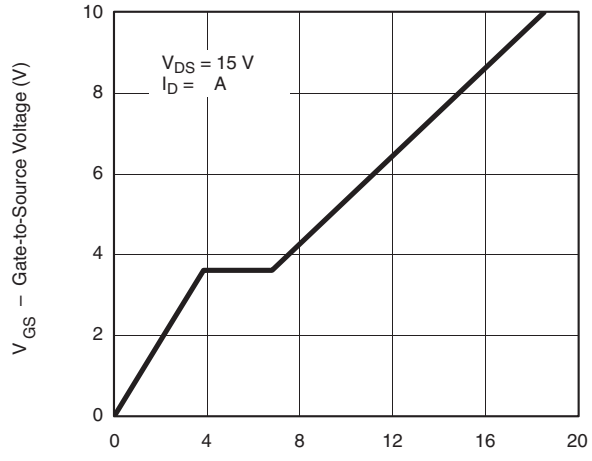
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



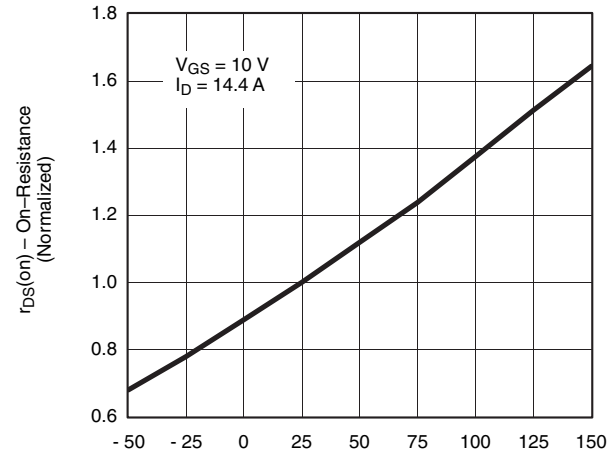
On-Resistance vs. Drain Current



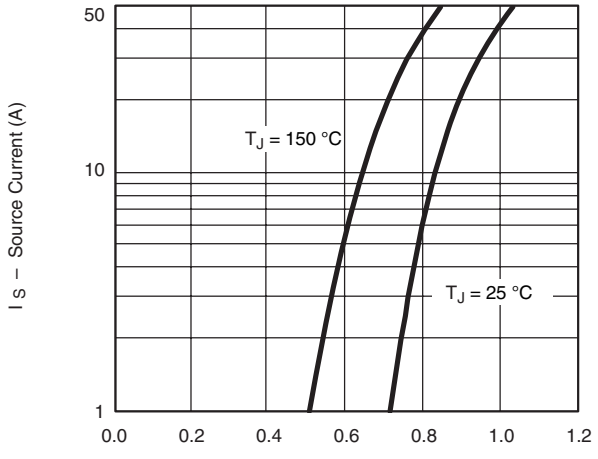
Capacitance



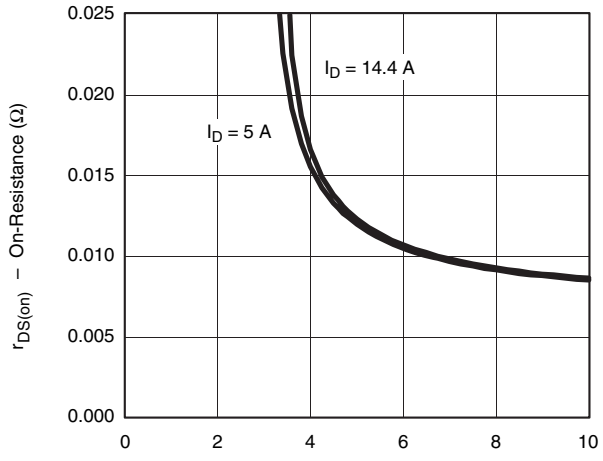
Gate Charge



On-Resistance vs. Junction Temperature

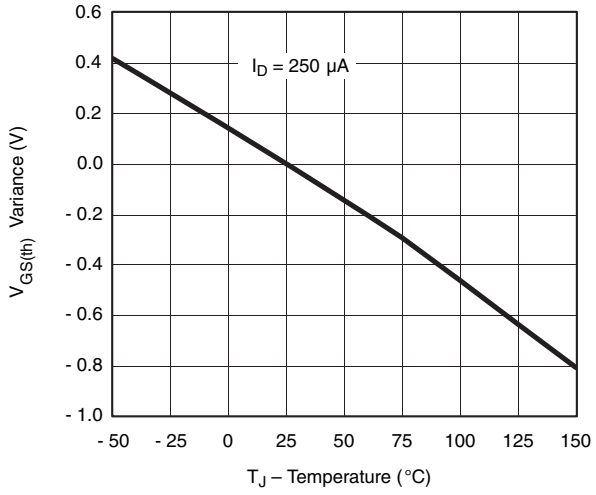


Source-Drain Diode Forward Voltage

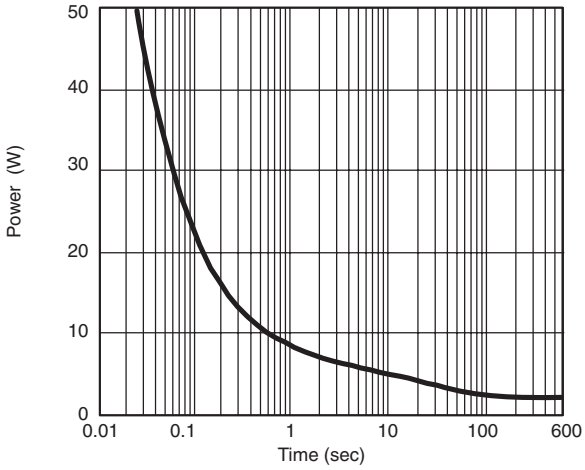


On-Resistance vs. Gate-to-Source Voltage

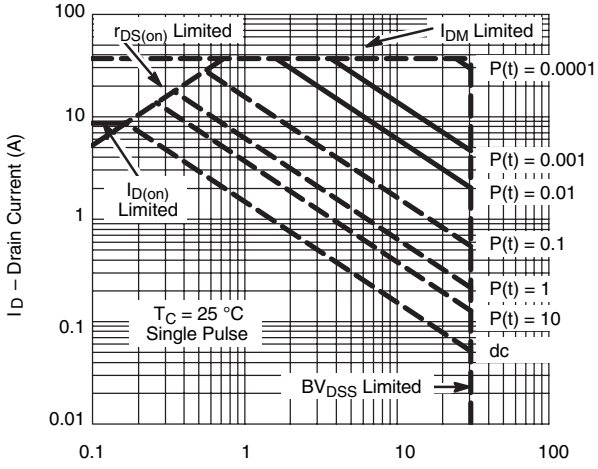
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



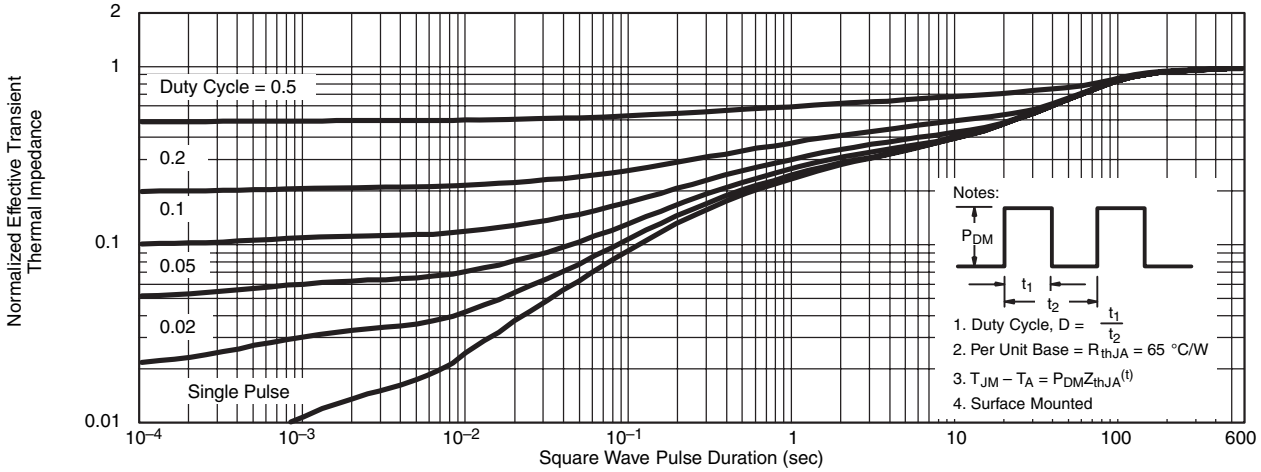
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

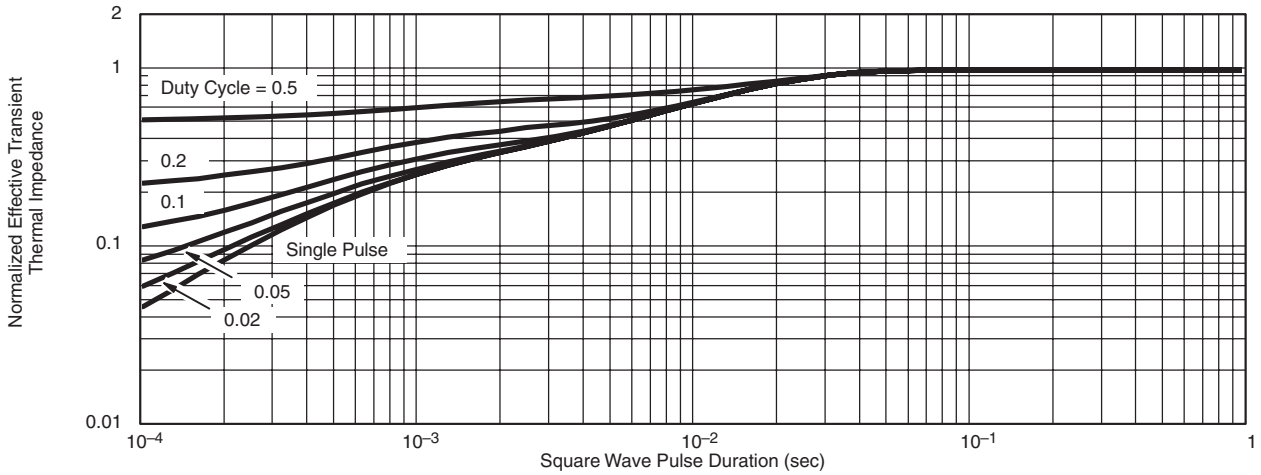


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Case

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see http://www.vishay.com/ppg?71869.

Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.