

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

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
30	0.0145 at $V_{GS} = 10$ V	12.6
	0.0205 at $V_{GS} = 4.5$ V	10.6

FEATURES

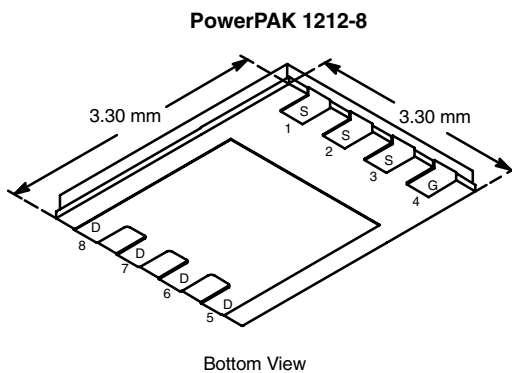
- TrenchFET[®] Power MOSFETS
- PWM Optimized
- New Low Thermal Resistance PowerPAK[®] Package with Low 1.07 mm Profile



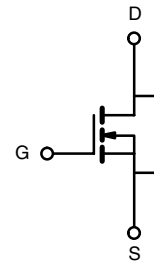
RoHS
COMPLIANT

APPLICATIONS

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



Ordering Information: Si7806BDN-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	12.6	8.0	A
	$T_A = 70$ °C	10.1	6.4	
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	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

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 10$ 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.



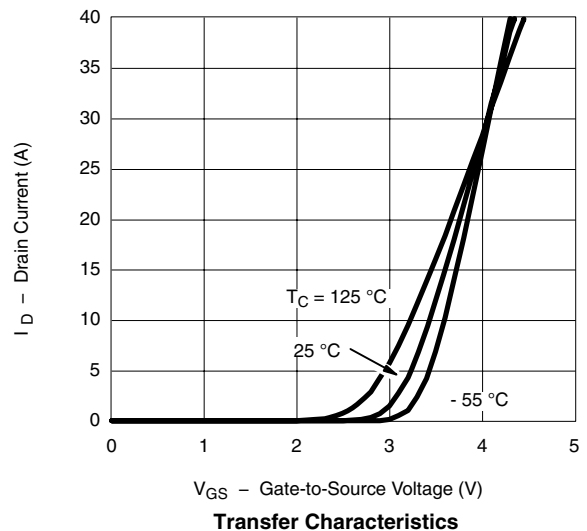
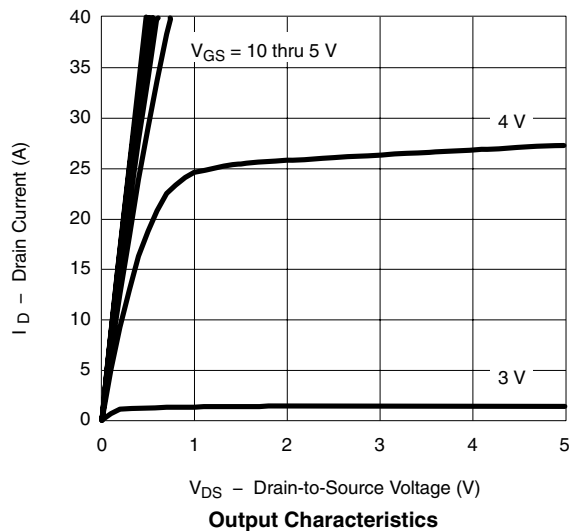
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		3	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	40			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 12.6\text{ A}$		0.012	0.0145	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 10.6\text{ A}$		0.017	0.0205	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 12.6\text{ A}$		34		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 3.2\text{ A}, V_{GS} = 0\text{ V}$		0.77	1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 12.6\text{ A}$		8.5	11	nC
	Q_{gt}			19	24	
Gate-Source Charge	Q_{gs}	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 12.6\text{ A}$		3.6		nC
Gate-Drain Charge	Q_{gd}			3.0		
Gate Resistance	R_g	$f = 10\text{ MHz}$		2		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$		8	15	ns
Rise Time	t_r			12	20	
Turn-Off Delay Time	$t_{d(off)}$			25	40	
Fall Time	t_f			10	20	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 3.2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		35	70	

Notes:

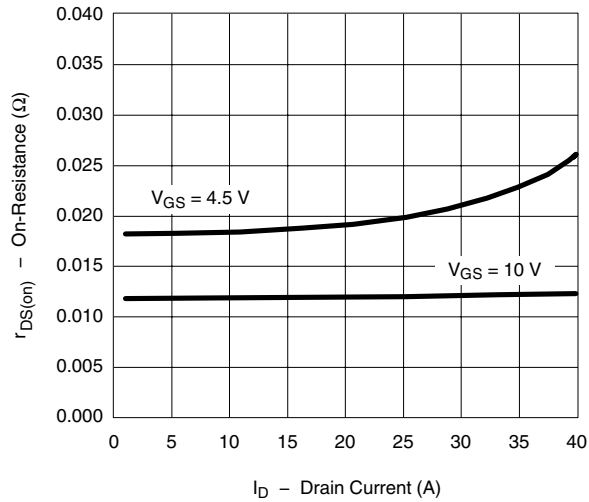
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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.

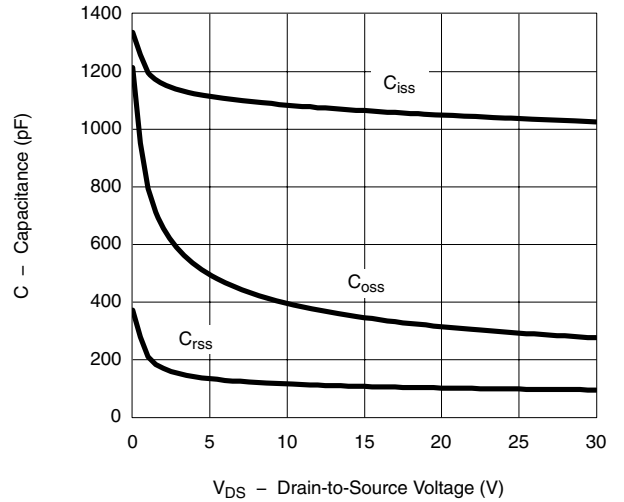
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$ unless noted



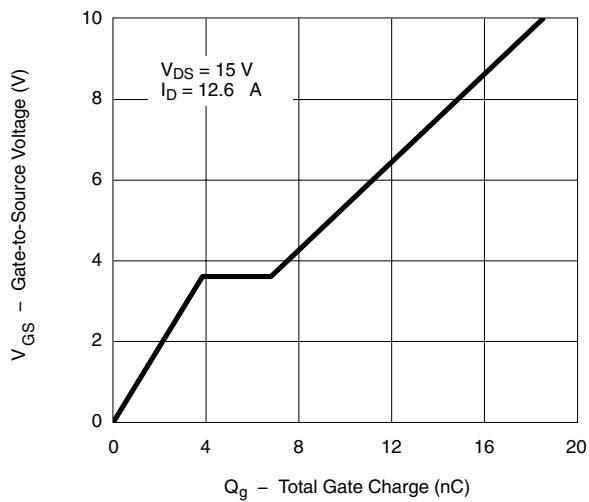
TYPICAL CHARACTERISTICS 25 °C unless noted



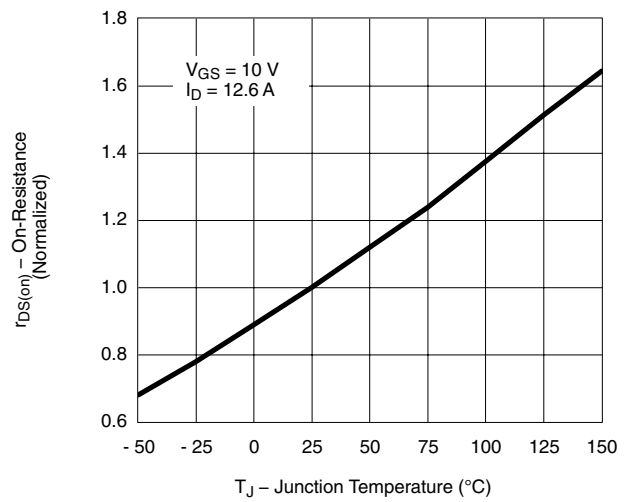
On-Resistance vs. Drain Current



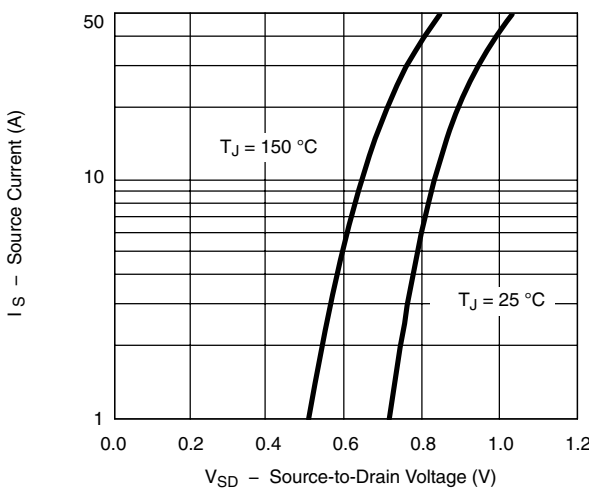
Capacitance



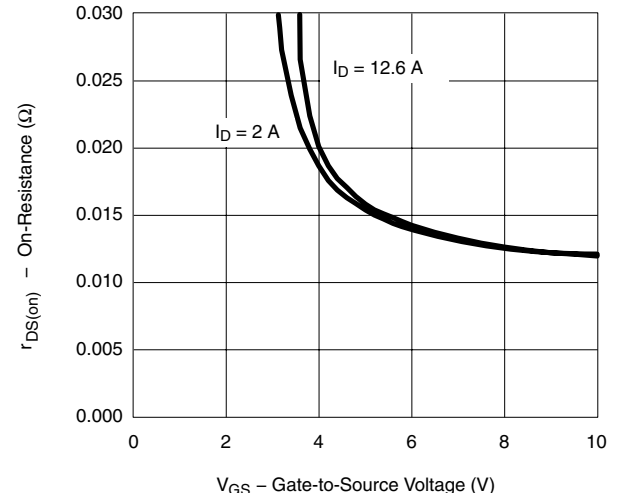
Gate Charge



On-Resistance vs. Junction Temperature

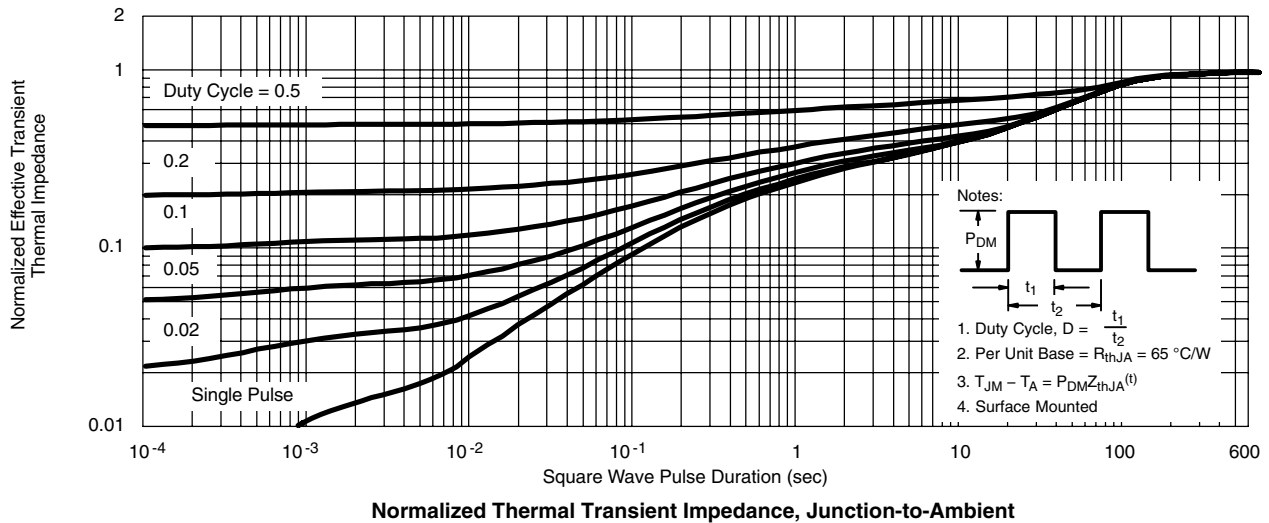
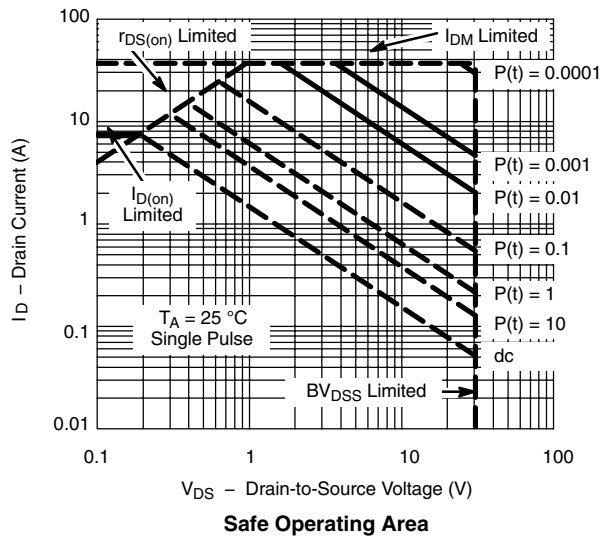
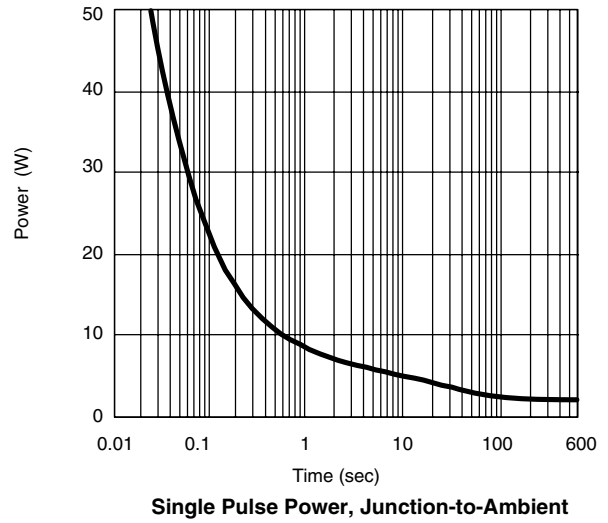
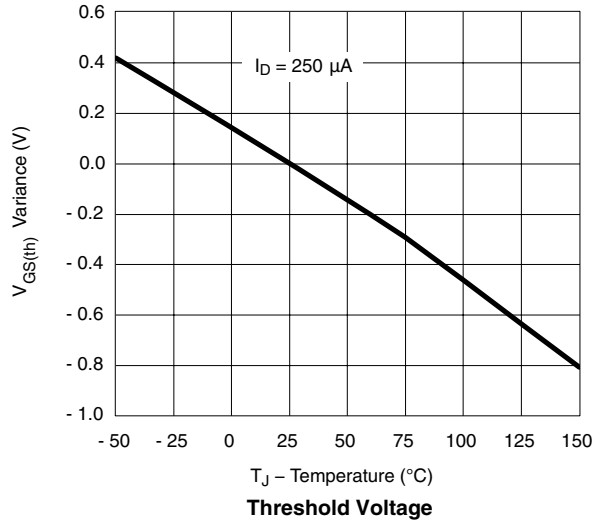


Source-Drain Diode Forward Voltage



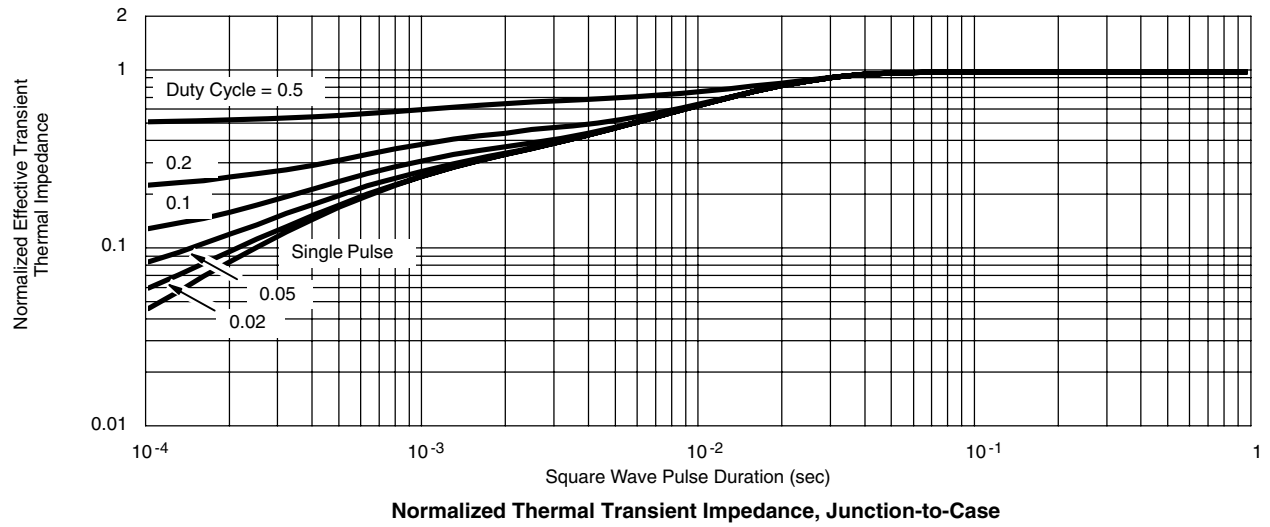
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C unless noted





TYPICAL CHARACTERISTICS 25 °C unless noted



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?73081>.



Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.