



New Product

Si7806BDN

Vishay Siliconix

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

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
30	0.0145 at V <sub>GS</sub> = 10 V	12.6
	0.0205 at V <sub>GS</sub> = 4.5 V	10.6

### FEATURES

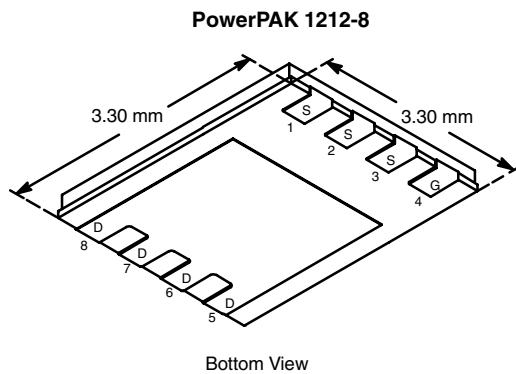
- TrenchFET<sup>®</sup> Power MOSFETS
- PWM Optimized
- New Low Thermal Resistance PowerPAK<sup>®</sup> Package with Low 1.07 mm Profile



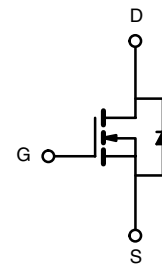
RoHS COMPLIANT

### 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 <sub>A</sub> = 25 °C unless otherwise noted					
Parameter	Symbol	10 secs	Steady State	Unit	
Drain-Source Voltage	V <sub>DS</sub>	30		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	12.6	8.0	A
		T <sub>A</sub> = 70 °C	10.1	6.4	
Pulsed Drain Current	I <sub>DM</sub>	40		A	
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	3.2	1.3		
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	3.8	1.5	W
		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	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	t ≤ 10 sec	R <sub>thJA</sub>	24	33	°C/W
	Steady State		65	81	
Maximum Junction-to-Case (Drain)	Steady State	R <sub>thJC</sub>	1.9	2.4	

Notes:

a. Surface Mounted on 1" x 1" FR4 Board.

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<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		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	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	40			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 12.6\text{ A}$		0.012	0.0145	$\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 10.6\text{ A}$		0.017	0.0205	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 12.6\text{ A}$		34		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 3.2\text{ A}, V_{GS} = 0\text{ V}$		0.77	1.2	V
<b>Dynamic<sup>b</sup></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		$\Omega$
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	

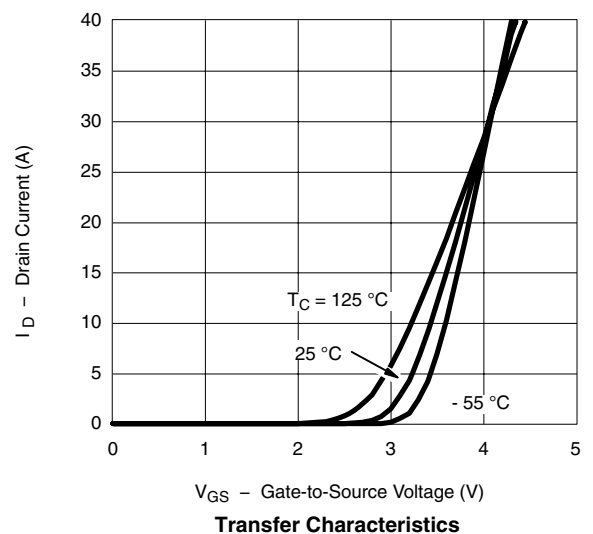
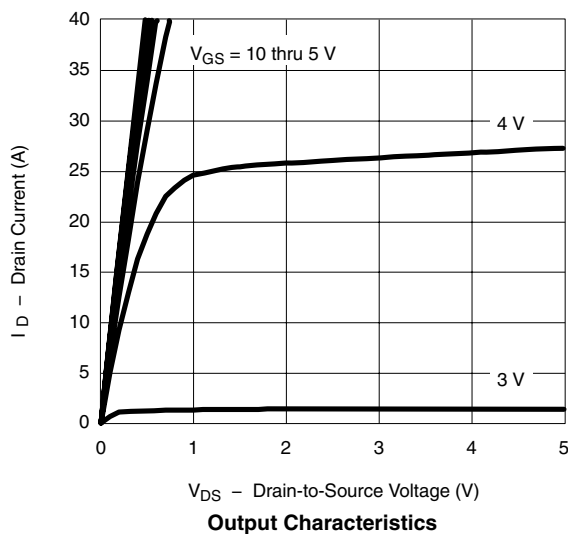
Notes:

a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

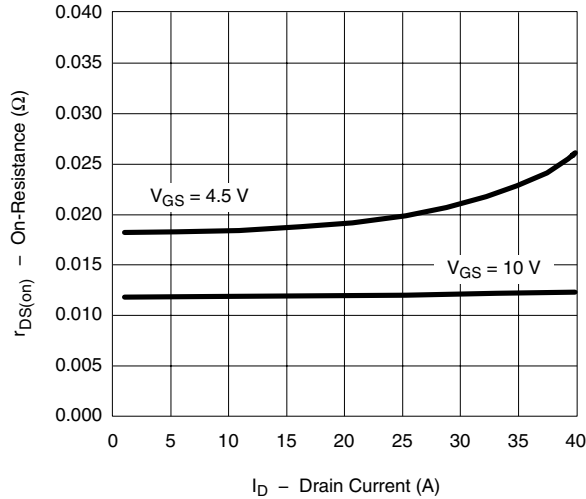
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

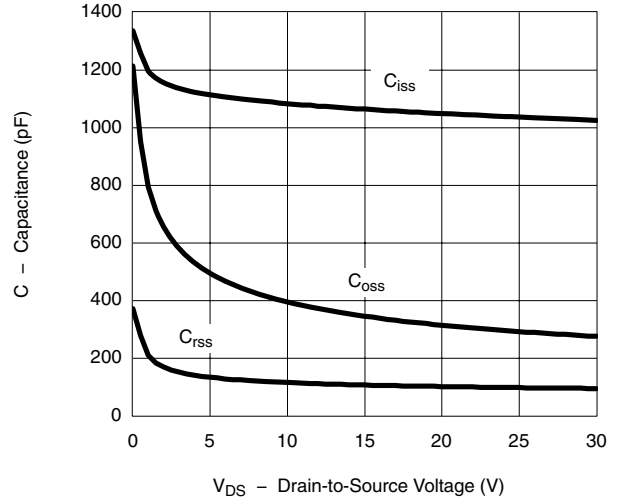




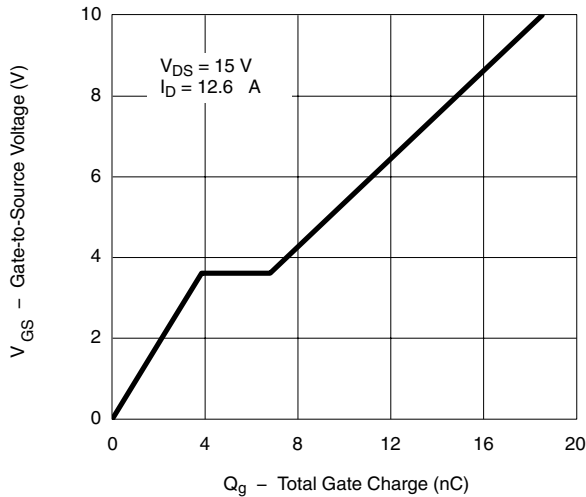
**TYPICAL CHARACTERISTICS** 25 °C unless noted



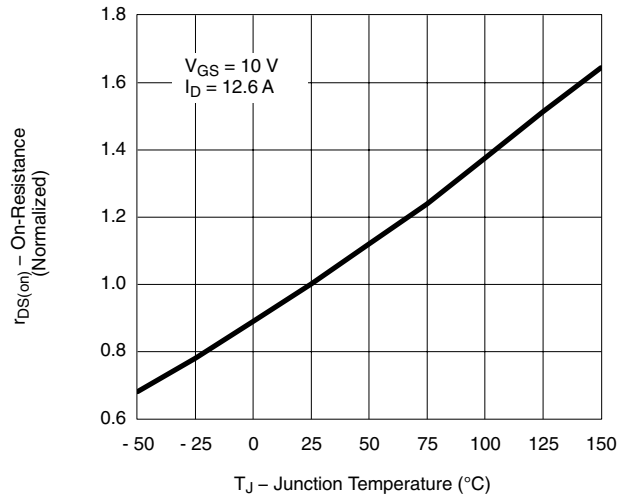
**On-Resistance vs. Drain Current**



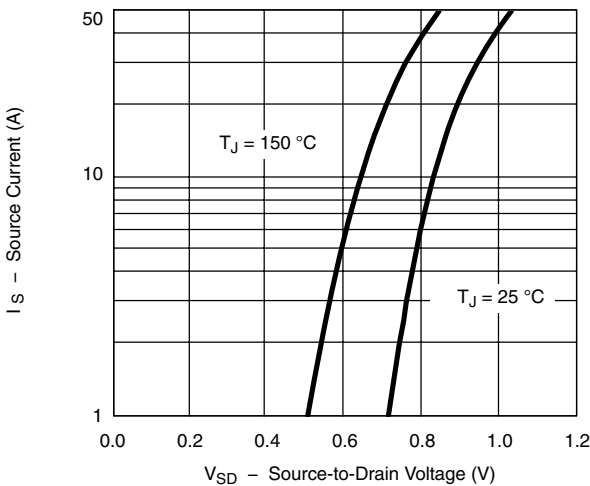
**Capacitance**



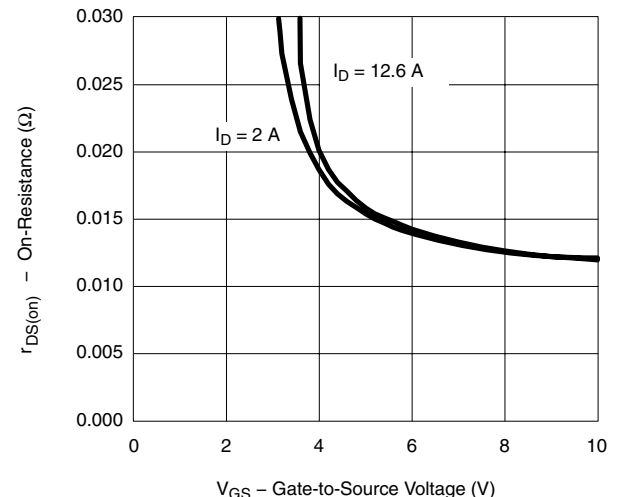
**Gate Charge**



**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**



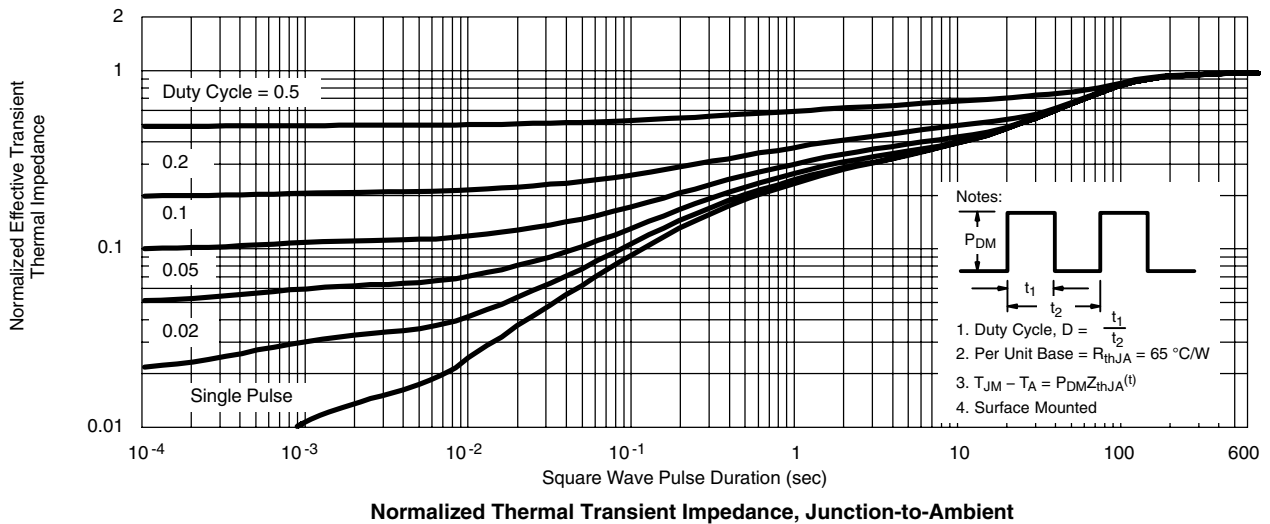
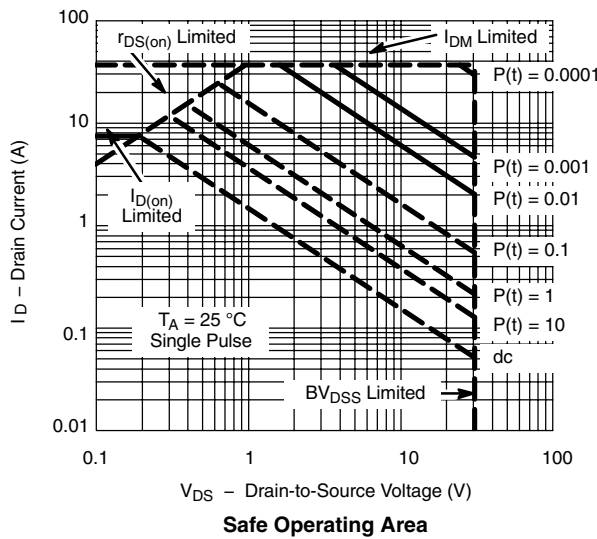
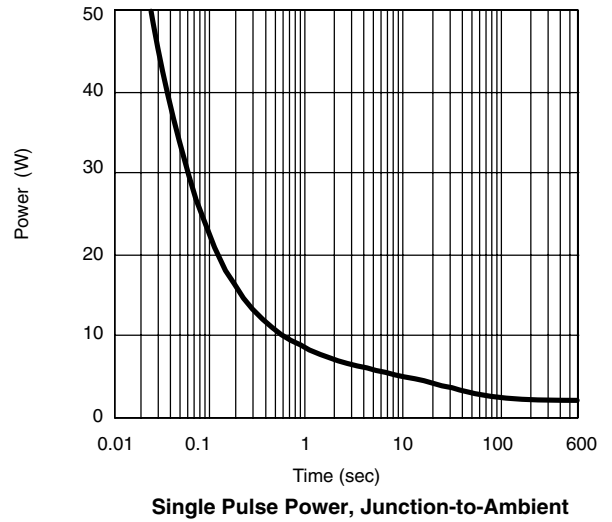
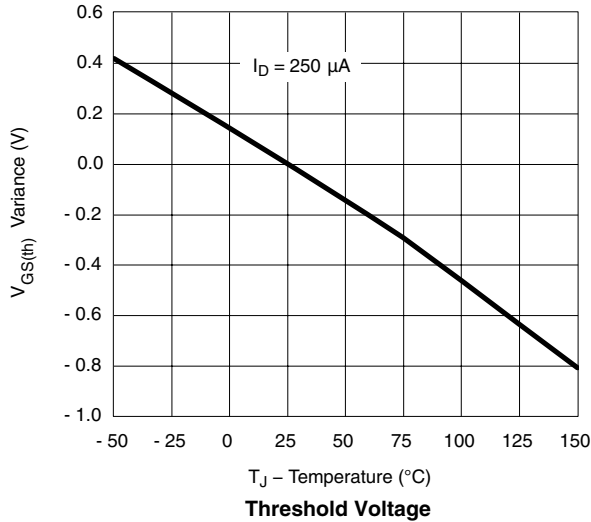
**On-Resistance vs. Gate-to-Source Voltage**

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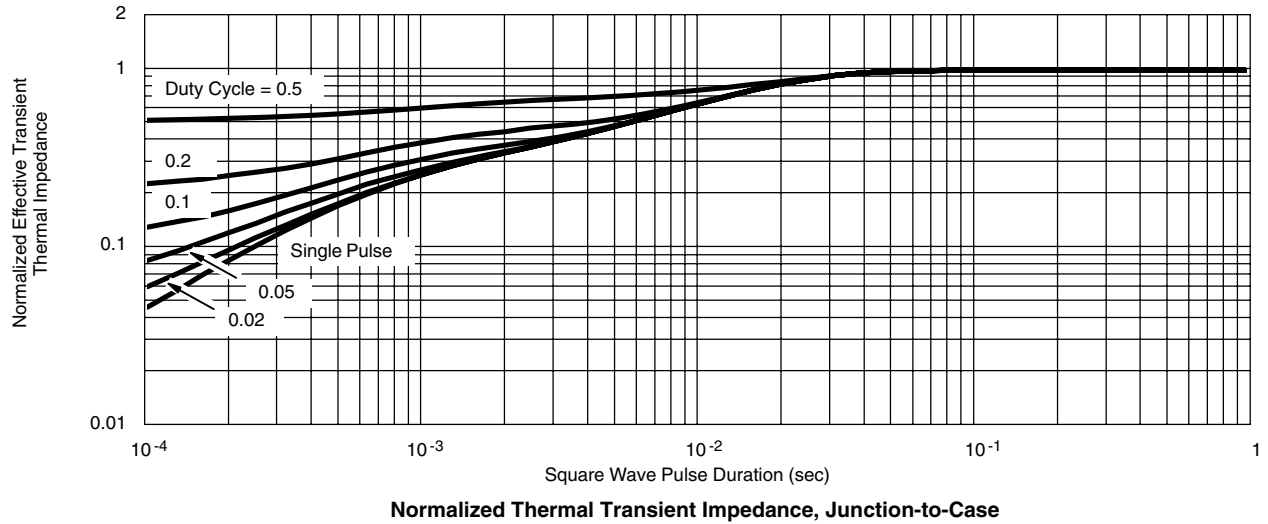


## TYPICAL CHARACTERISTICS 25 °C unless noted





**TYPICAL CHARACTERISTICS** 25 °C unless noted



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