

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

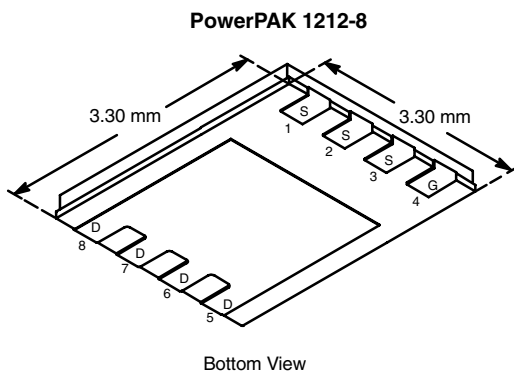
- TrenchFET[®] Power MOSFETS
- PWM Optimized
- New Low Thermal Resistance PowerPAK[®] Package with Low 1.07 mm Profile



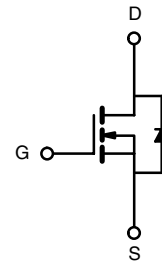
RoHS
COMPLIANT

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	I_D	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	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	

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	

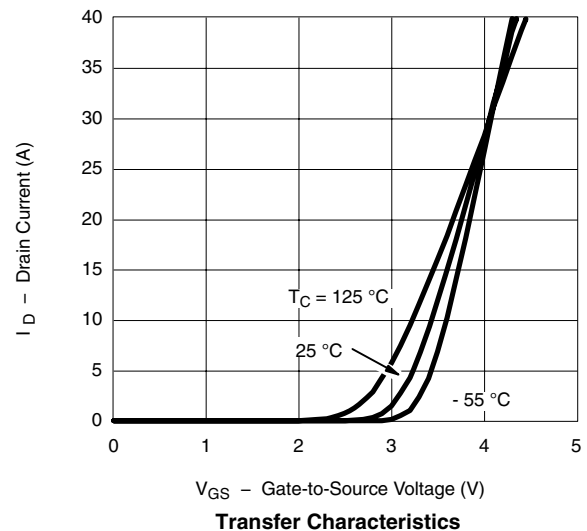
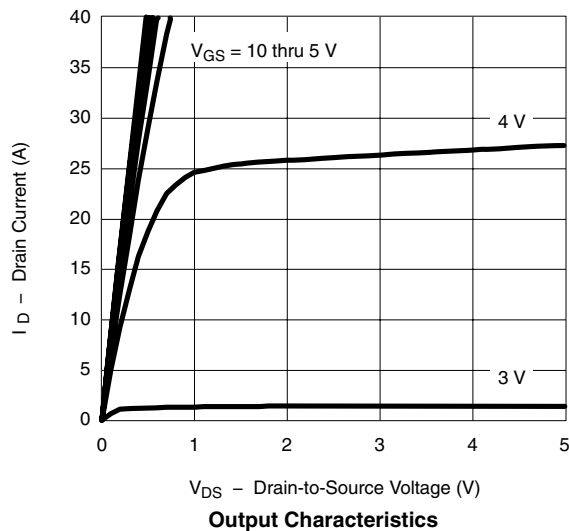
Notes:

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

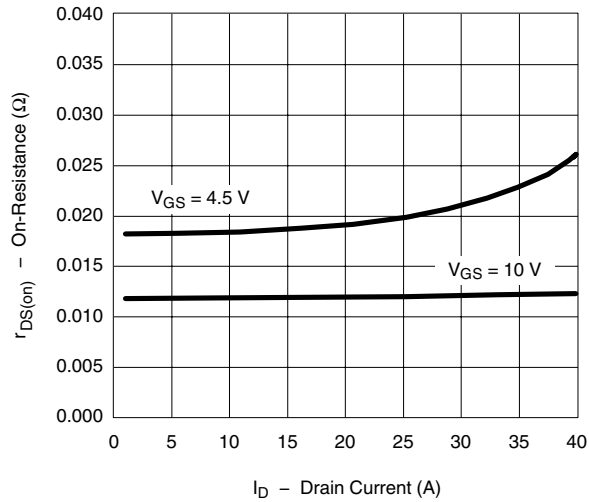
b. Guaranteed by design, not subject to production testing.

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.

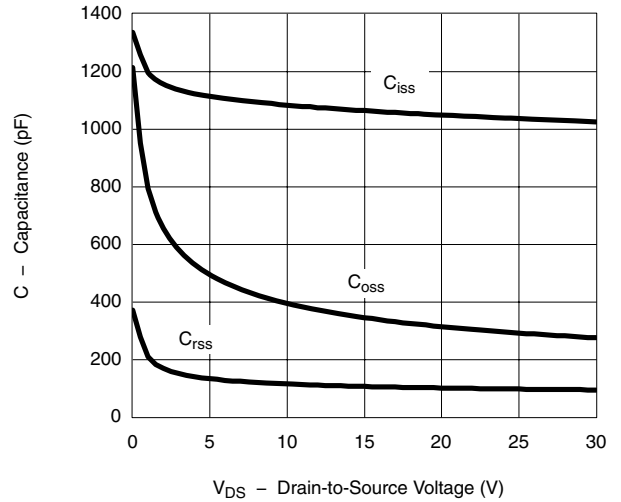
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$ unless noted



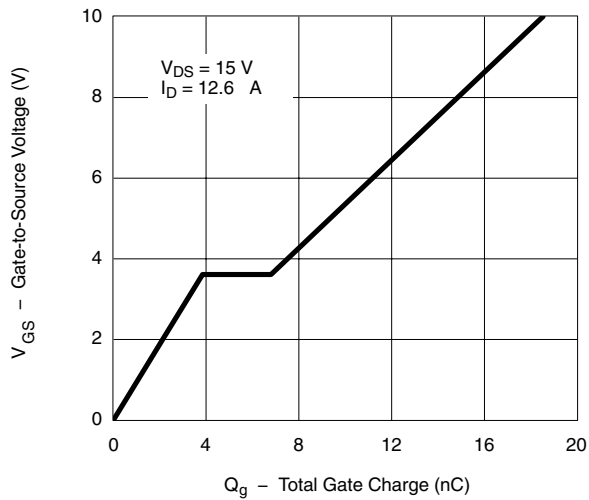
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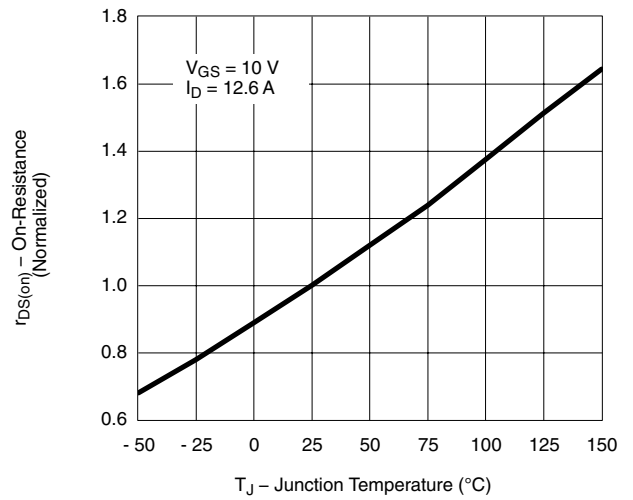
On-Resistance vs. Drain Current



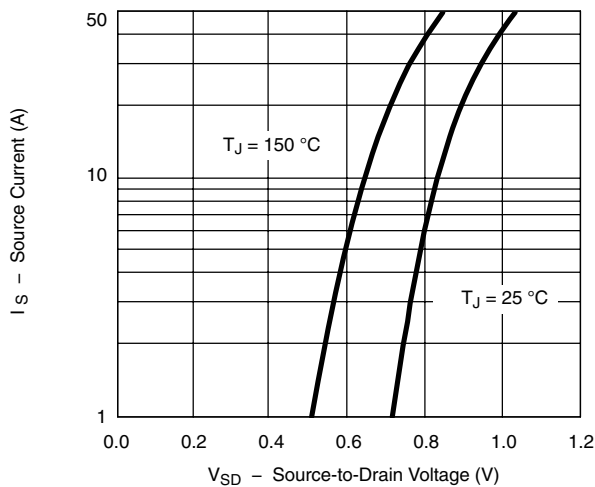
Capacitance



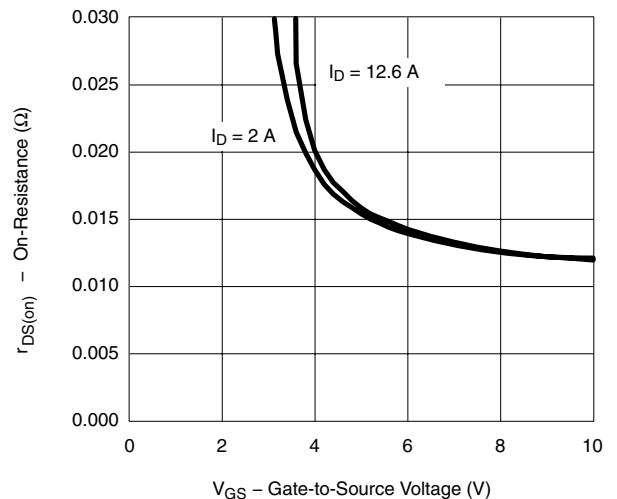
Gate Charge



On-Resistance vs. Junction Temperature

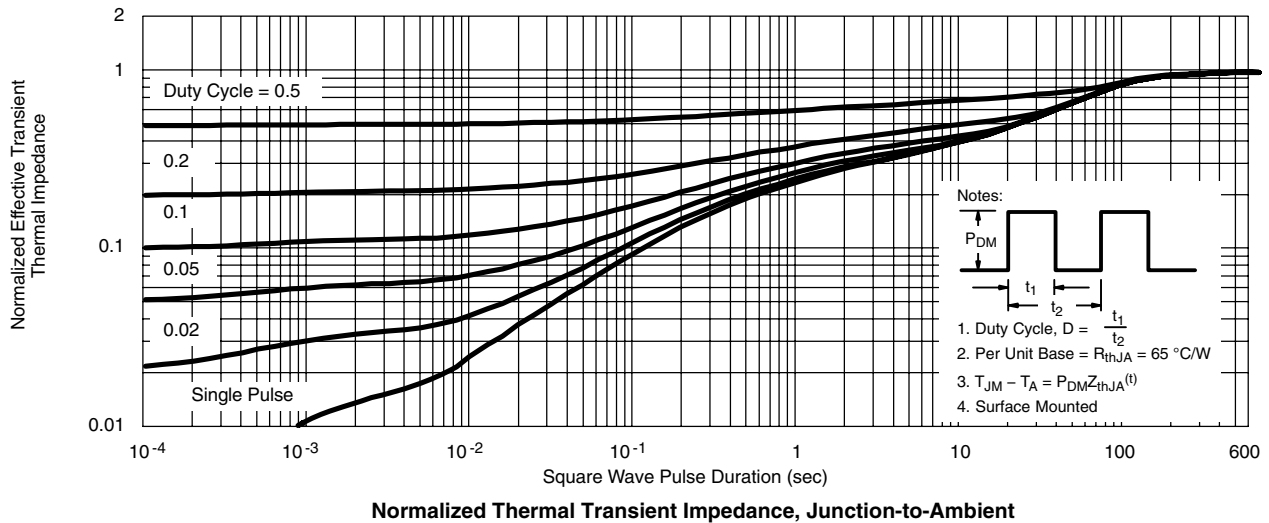
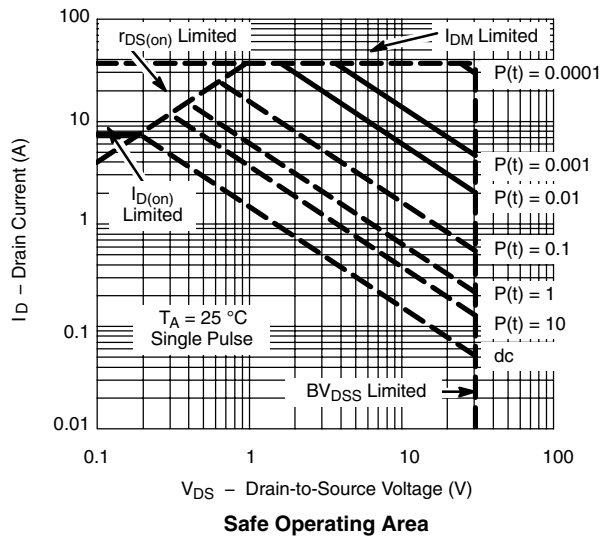
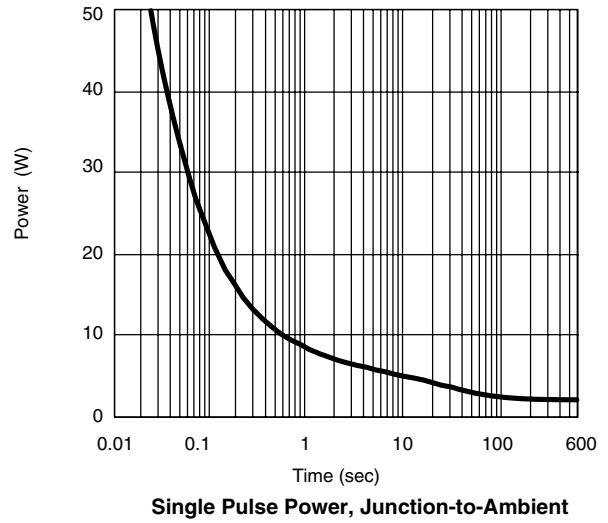
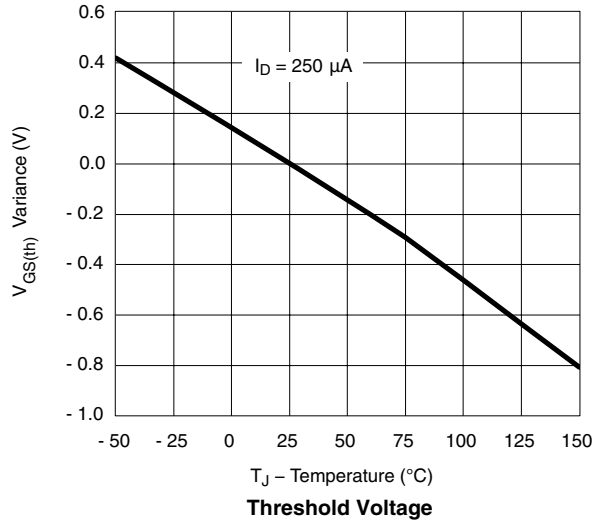


Source-Drain Diode Forward Voltage



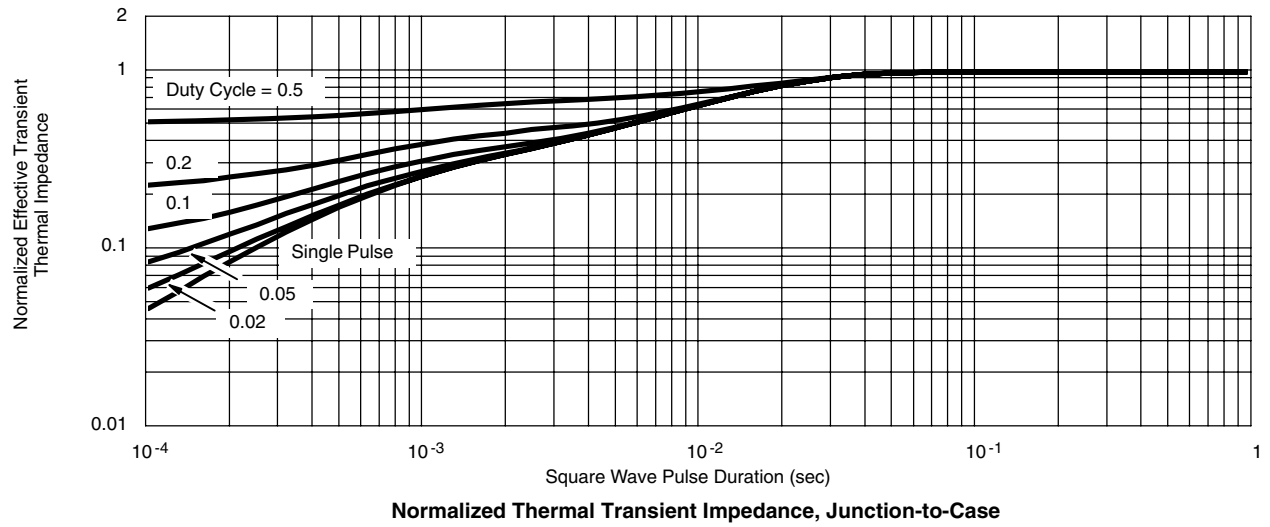
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C unless noted





TYPICAL CHARACTERISTICS 25 °C unless noted



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