

## N-Channel Reduced $Q_g$ , Fast Switching MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
12	0.0055 at $V_{GS} = 4.5$ V	17
	0.008 at $V_{GS} = 2.5$ V	14

### FEATURES

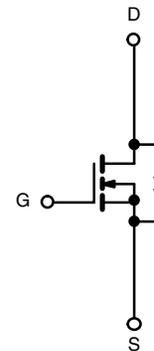
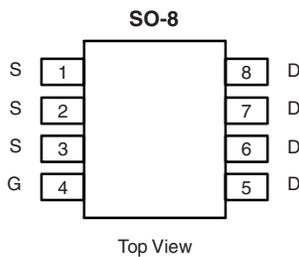
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFETs
- PWM Optimized for High Efficiency
- Low Output Voltage
- 100 %  $R_g$  Tested



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

### APPLICATIONS

- Synchronous Rectifier
- Point-of-Load Synchronous Buck Converter



**Ordering Information:** Si4866DY-T1-E3 (Lead Pb)-free  
Si4866DY-T1-GE3 (Lead Pb)-free and Halogen-free

N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted					
Parameter	Symbol	10 s	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	12		V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$			
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	$T_A = 25$ °C	17	11	A
		$T_A = 70$ °C	14	8	
Pulsed Drain Current	$I_{DM}$	$\pm 50$			
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	2.7	1.40	W	
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25$ °C	3.0		1.6
		$T_A = 70$ °C	2.0	1.0	
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 (MOSFET) <sup>a</sup>	$R_{thJA}$	$t \leq 10$ s	34	41	°C/W
		Steady State	67	80	
Maximum Junction-to-Foot (Drain)	$R_{thJF}$	15	19		

Notes:

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



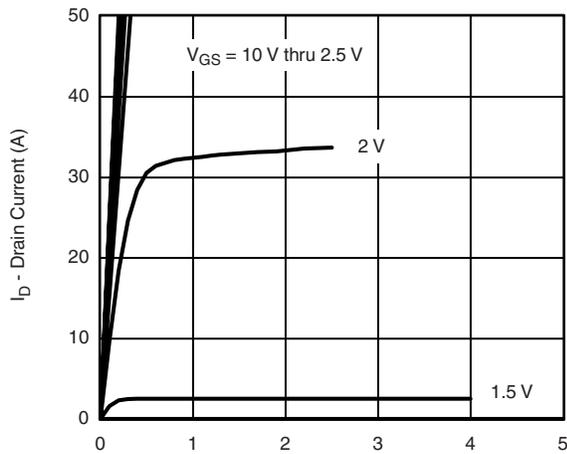
MOSFET SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.6			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 8\ \text{V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 9.6\ \text{V}, V_{GS} = 0\ \text{V}$			1	$\mu\text{A}$
		$V_{DS} = 9.6\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70\text{ }^\circ\text{C}$			5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\ \text{V}, V_{GS} = 4.5\ \text{V}$	40			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5\ \text{V}, I_D = 17$		0.0045	0.0055	$\Omega$
		$V_{GS} = 2.5\ \text{V}, I_D = 14$		0.0065	0.008	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 6\ \text{V}, I_D = 17$		80		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 2.7\ \text{A}, V_{GS} = 0\ \text{V}$		0.70	1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 6\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 17\ \text{A}$		21	30	nC
Gate-Source Charge	$Q_{gs}$			4.6		
Gate-Drain Charge	$Q_{gd}$			3.5		
Gate Resistance	$R_G$		1.5	2.3	3.9	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 6\ \text{V}, R_L = 6\ \Omega$ $I_D \cong 1\ \text{A}, V_{GEN} = 4.5\ \text{V}, R_G = 6\ \Omega$		28	42	ns
Rise Time	$t_r$			32	48	
Turn-Off Delay Time	$t_{d(off)}$			82	123	
Fall Time	$t_f$			35	53	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 2.7\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$		60	90	

Notes:

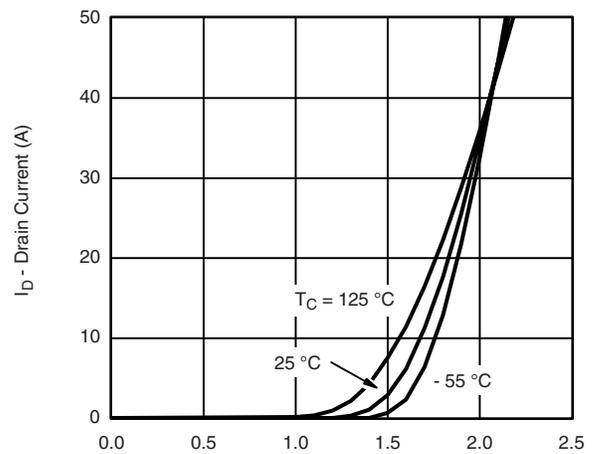
- a. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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 otherwise noted

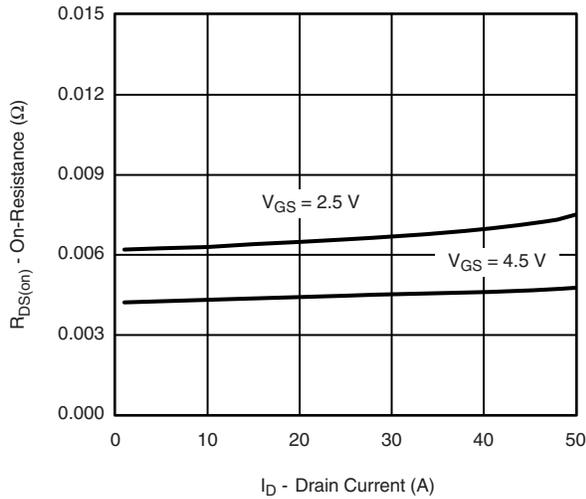


Output Characteristics

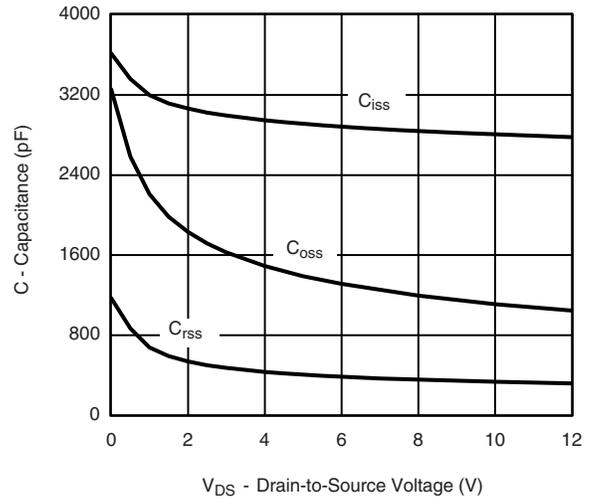


Transfer Characteristics

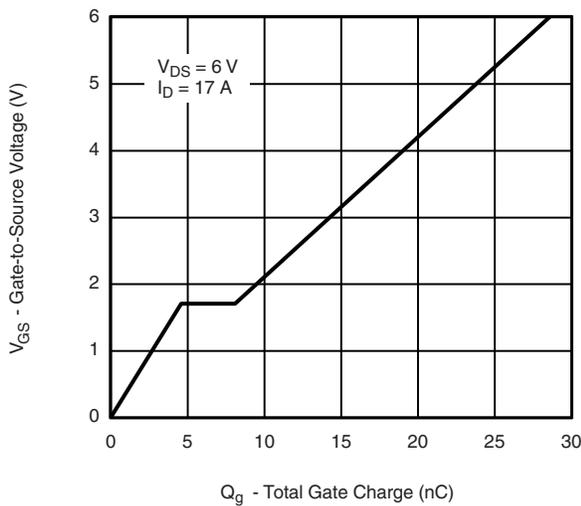
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



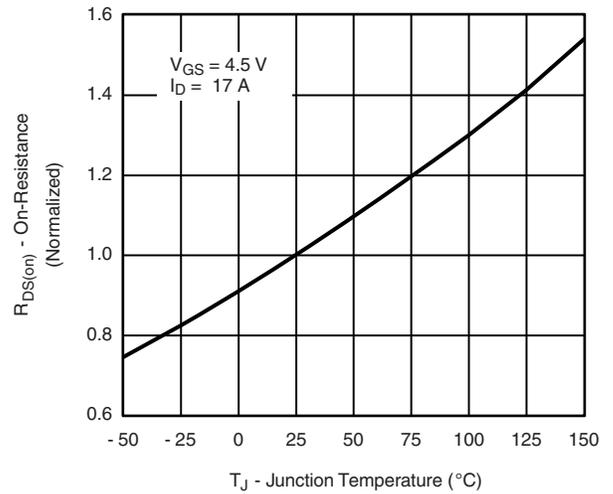
**On-Resistance vs. Drain Current**



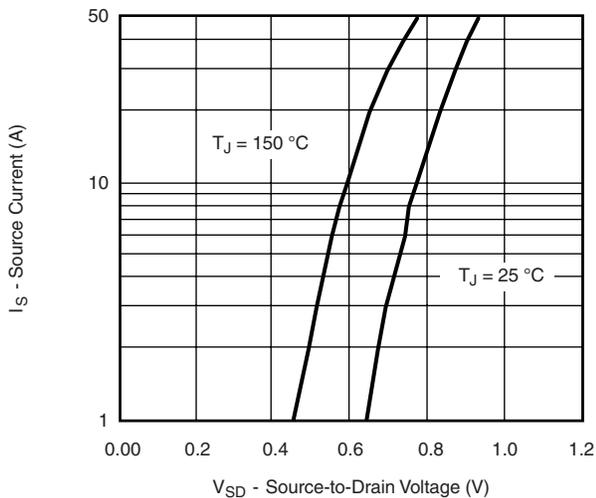
**Capacitance**



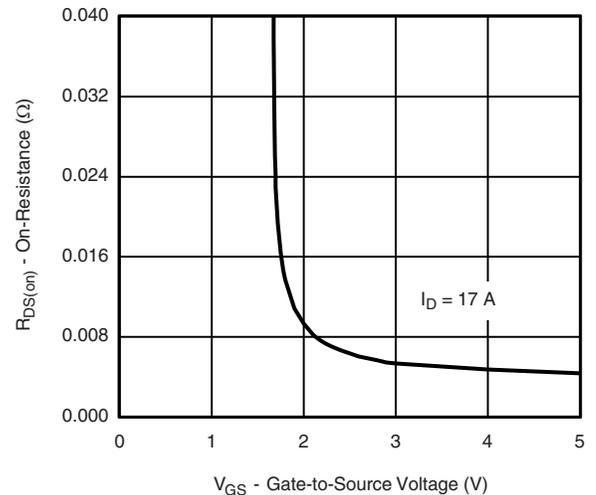
**Gate Charge**



**On-Resistance vs. Junction Temperature**

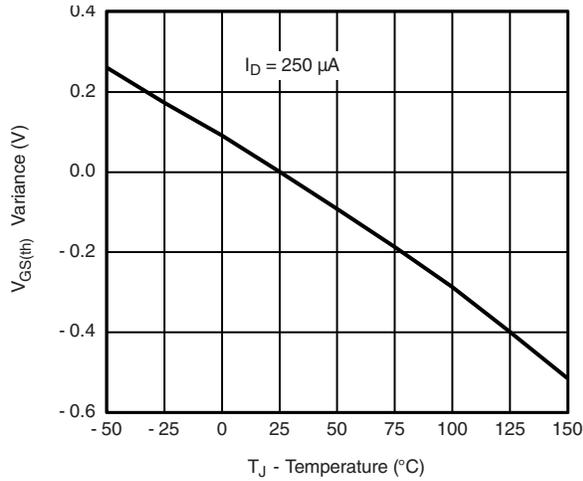


**Source-Drain Diode Forward Voltage**

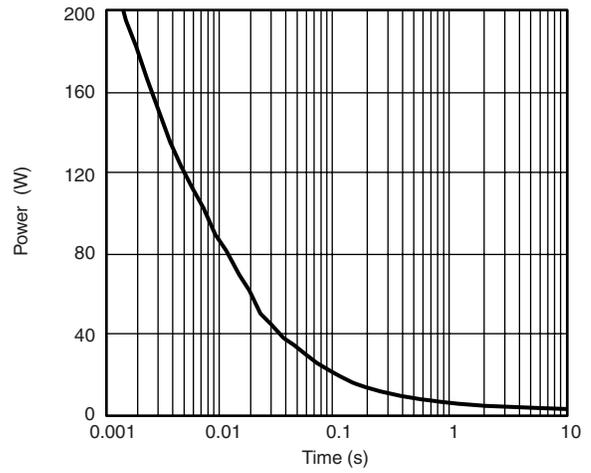


**On-Resistance vs. Gate-to-Source Voltage**

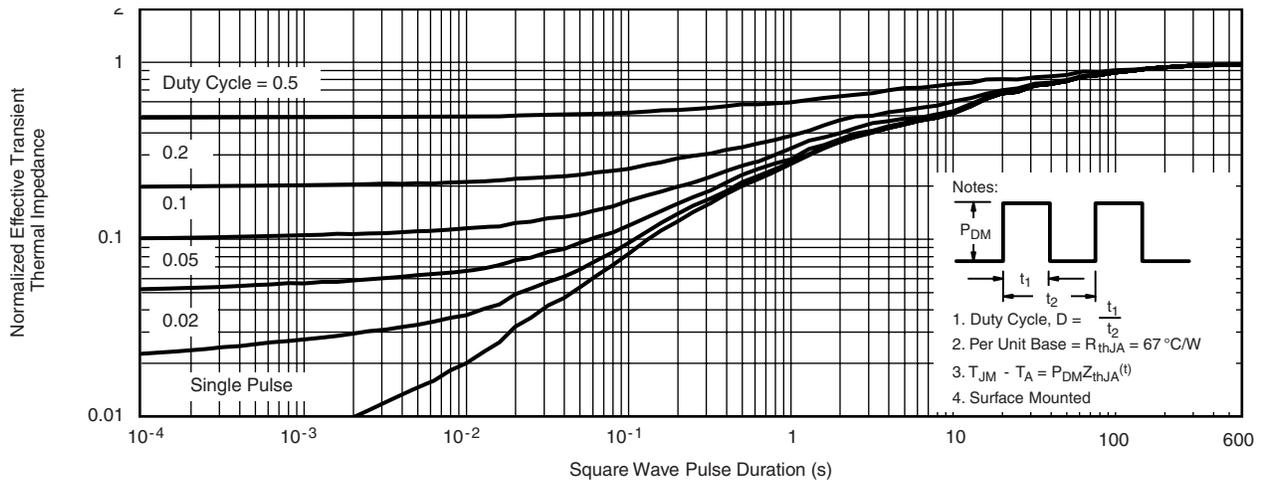
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



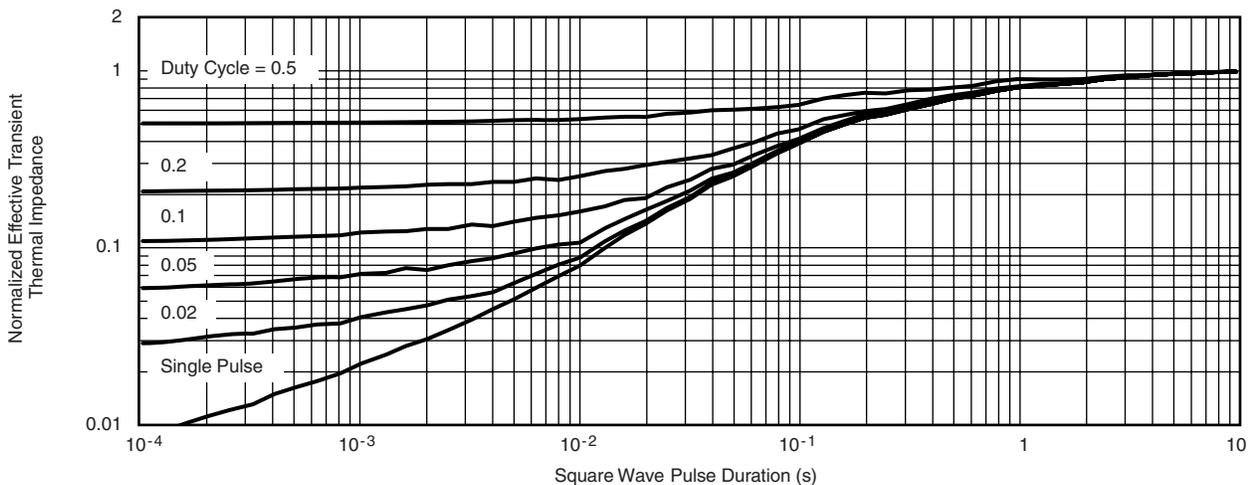
**Threshold Voltage**



**Single Pulse Power**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

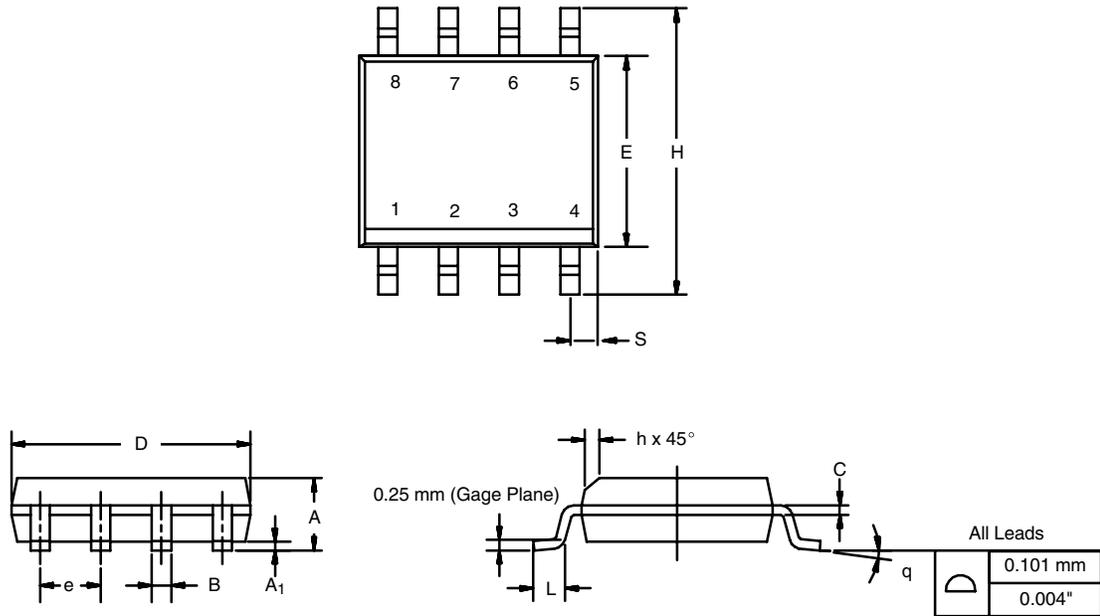


**Normalized Thermal Transient Impedance, Junction-to-Foot**

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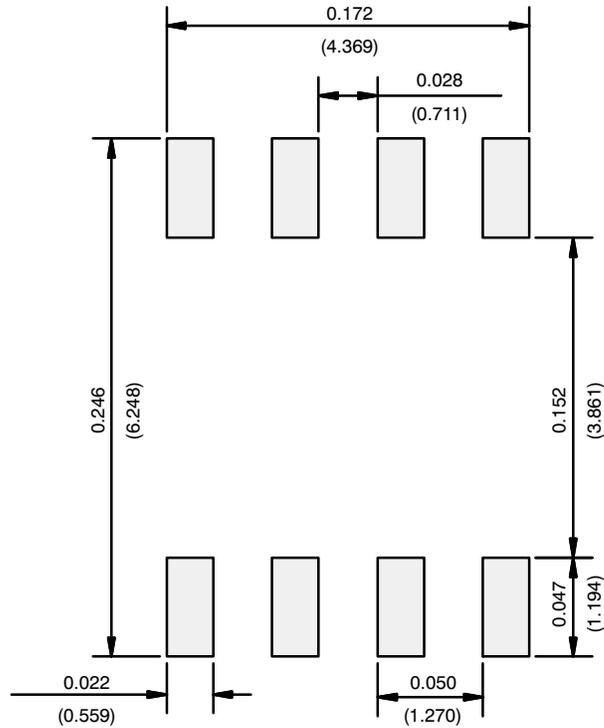
## SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A <sub>1</sub>	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

## RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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