

N-Channel 250-V (D-S) MOSFET

PRODUCT SUMMARY		
V _{DS} (V)	R _{rDS(on)} (Ω)	I _D (A)
250	0.155 at V _{GS} = 10 V	3.0
	0.162 at V _{GS} = 6.0 V	2.9

FEATURES

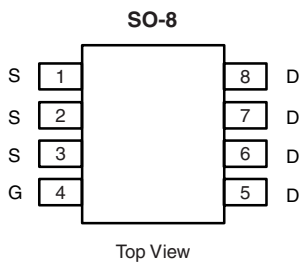
- Halogen-free According to IEC 61249-2-21 Definition
- PWM-Optimized TrenchFET® Power MOSFET
- 100 % R_g Tested
- Avalanche Tested



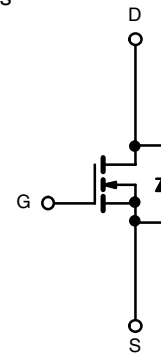
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Primary Side Switch In:
 - Telecom Power Supplies
 - Distributed Power Architectures
 - Miniature Power Modules



Ordering Information: Si4434DY-T1-E3 (Lead (Pb)-free)
Si4434DY-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}	250		V
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C) ^a	I _D	T _A = 25 °C	3.0	2.1
		T _A = 70 °C	2.4	1.7
Pulsed Drain Current	I _{DM}	30		A
Continuous Source Current (Diode Conduction) ^a	I _S	2.6	1.3	
Avalanche Current	I _{AS}	13		
Single Pulse Avalanche Energy	E _{AS}	8.4		mJ
Maximum Power Dissipation ^a	P _D	T _A = 25 °C	3.1	1.56
		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 ^a	R _{thJA}	t ≤ 10 s	33	40
		Steady State	65	80
Maximum Junction-to-Foot (Drain)	R _{thJF}	17	21	°C/W

Notes:

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

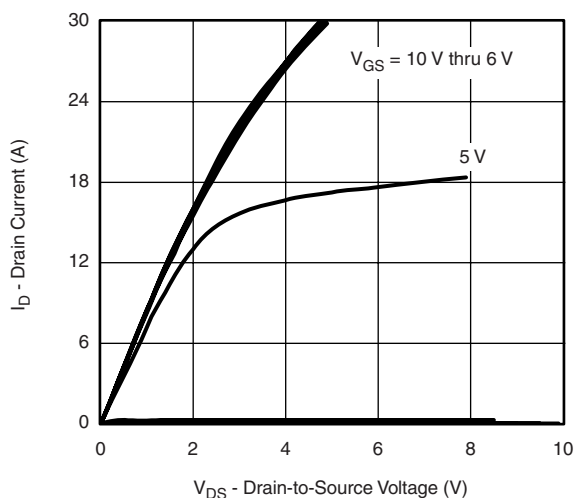
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0		4.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			15	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 3.0\text{ A}$		0.129	0.155	Ω
		$V_{GS} = 6.0\text{ V}, I_D = 2.9\text{ A}$		0.131	0.162	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 3.0\text{ A}$		14		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 2.8\text{ A}, V_{GS} = 0\text{ V}$		0.75	1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 100\text{ V}, V_{GS} = 10\text{ V}, I_D = 3.0\text{ A}$		34	50	nC
Gate-Source Charge	Q_{gs}			6.8		
Gate-Drain Charge	Q_{gd}			10.5		
Gate Resistance	R_g		0.6	1.2	1.8	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 25\text{ }\Omega$ $I_D \cong 4.0\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$		16	25	ns
Rise Time	t_r			23	35	
Turn-Off Delay Time	$t_{d(off)}$			47	70	
Fall Time	t_f			19	30	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 2.8\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		100	150	

Notes:

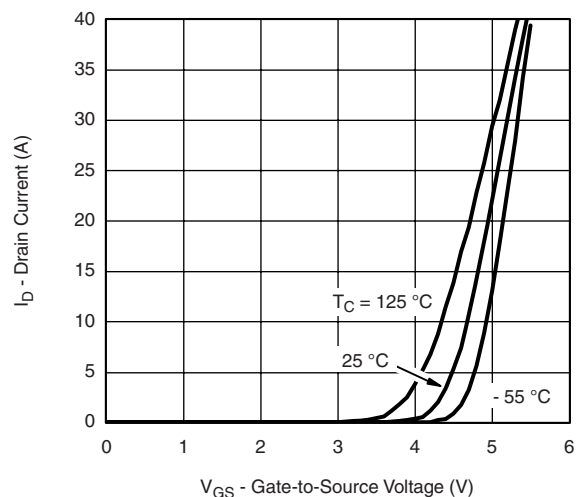
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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 otherwise noted

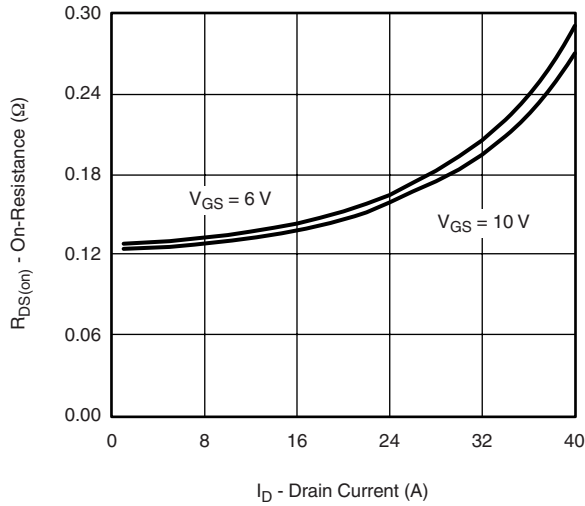


Output Characteristics

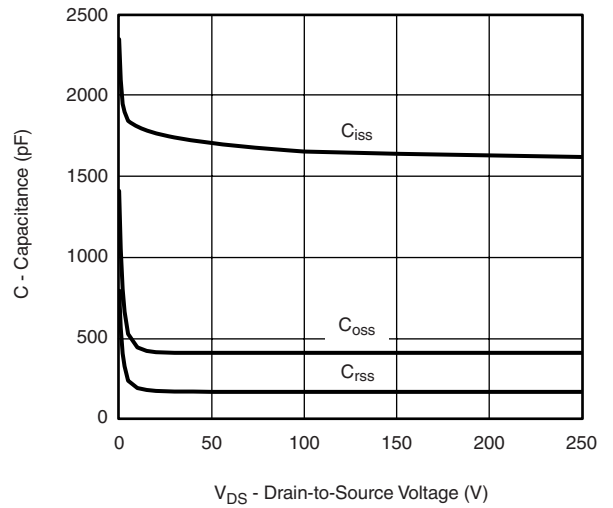


Transfer Characteristics

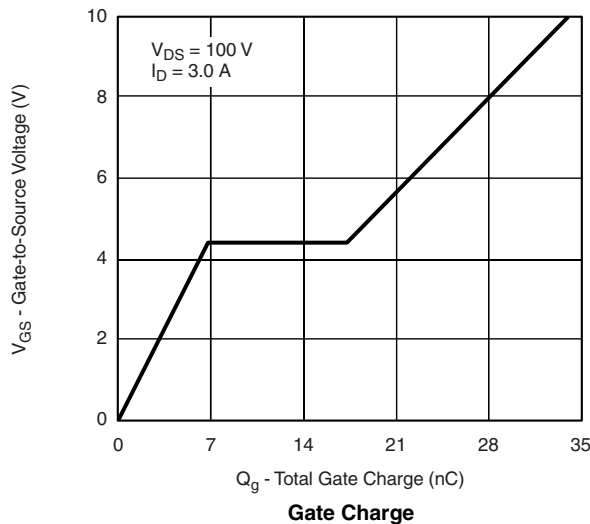
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



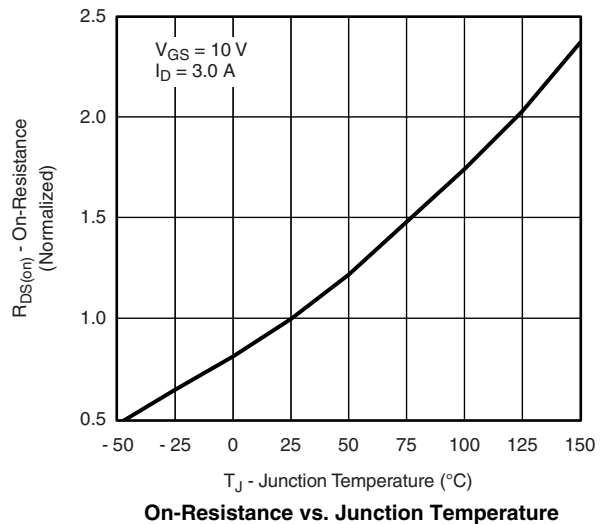
On-Resistance vs. Drain Current



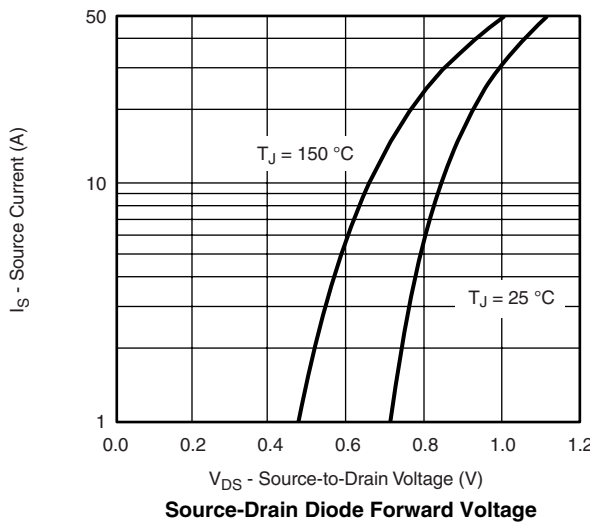
Capacitance



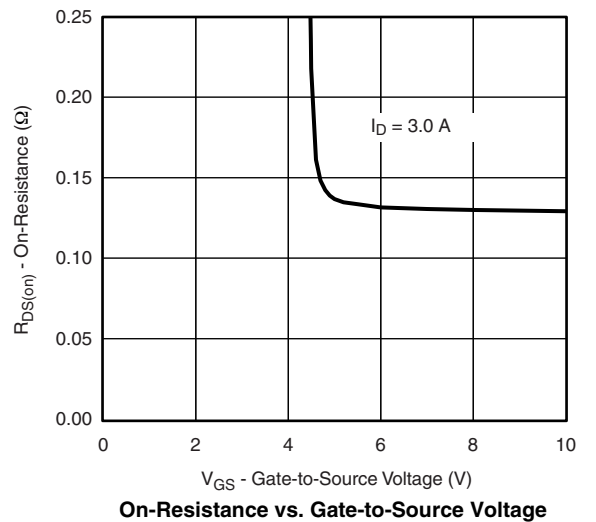
Gate Charge



On-Resistance vs. Junction Temperature

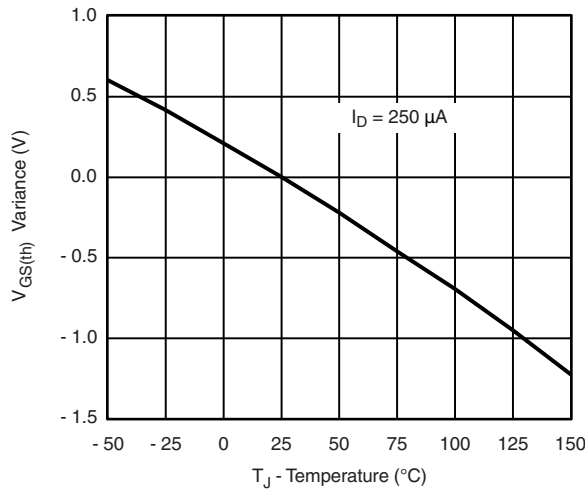


Source-Drain Diode Forward Voltage

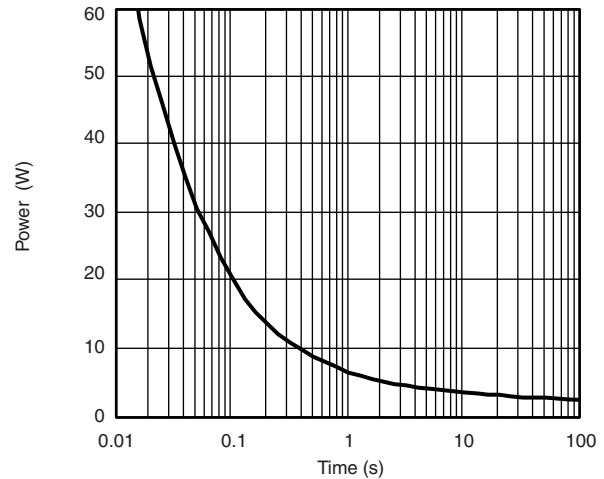


On-Resistance vs. Gate-to-Source Voltage

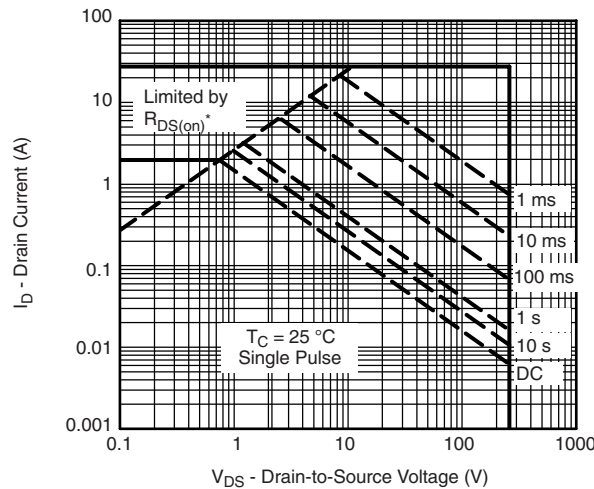
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



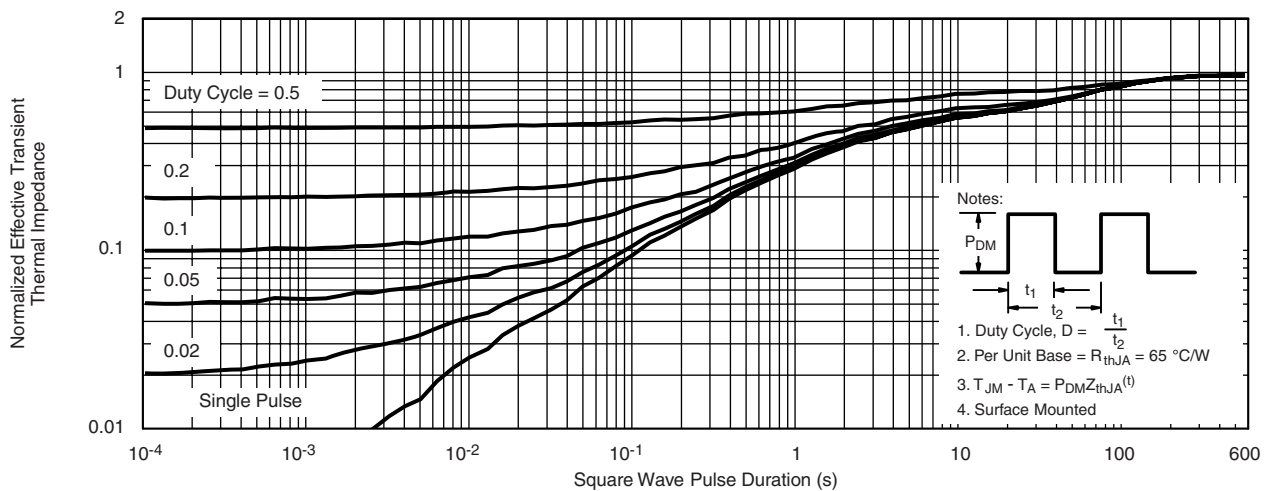
Threshold Voltage



Single Pulse Power



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Case

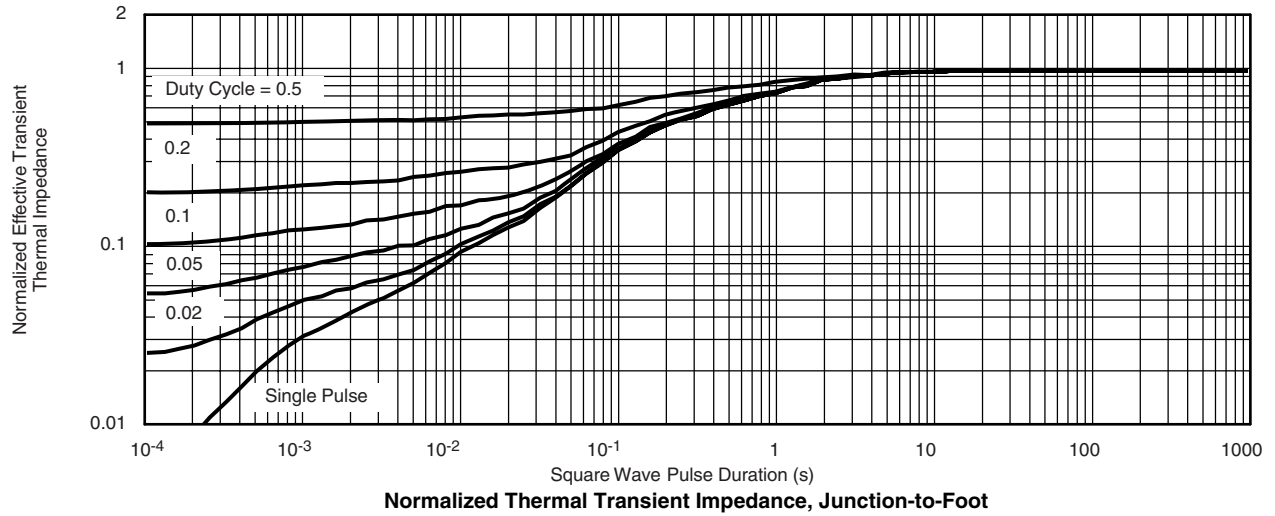


- Notes:
- Duty Cycle, $D = \frac{t_1}{t_2}$
 - Per Unit Base = $R_{thJA} = 65 \text{ }^\circ\text{C/W}$
 - $T_{JM} - T_A = P_{DM} Z_{thJA}^{(t)}$
 - Surface Mounted

Normalized Thermal Transient Impedance, Junction-to-Ambient



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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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 ₁	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)

[Return to Index](#)



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