



N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^d	Q _g (Typ.)
40	0.040 at V _{GS} = 10 V	5.2	8
	0.045 at V _{GS} = 4.5 V	4.9	

FEATURES

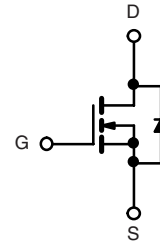
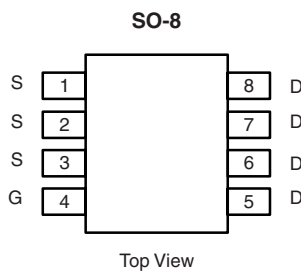
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g
- 100 % R_g UIS Tested



RoHS COMPLIANT
HALOGEN FREE
Available

APPLICATIONS

- CCFL Inverter



N-Channel MOSFET

Ordering Information: Si4446DY-T1-E3 (Lead (Pb)-free)
Si4446DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted				
Parameter	Symbol	10 s	Steady State	Unit
Drain-Source Voltage	V _{DS}	40		V
Gate-Source Voltage	V _{GS}	± 12		
Continuous Drain Current (T _J = 150 °C) ^a	I _D	T _A = 25 °C	5.2	3.9
		T _A = 70 °C	4.2	3.1
Pulsed Drain Current	I _{DM}	30		A
Continuous Source Current (Diode Conduction) ^a	I _S	1.7	0.9	
Avalanche Current	I _{AS}	13		
Single-Pulse Avalanche Energy	E _{AS}	8.5		mJ
Maximum Power Dissipation ^a	P _D	T _A = 25 °C	2.0	1.1
		T _A = 70 °C	1.3	0.7
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	52	62.5
		Steady State	90	110
Maximum Junction-to-Foot (Drain)	R _{thJF}	32	40	°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-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.6		1.6	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		40		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 3.8		
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 5.2\text{ A}$		0.033	0.040	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 4.9\text{ A}$		0.037	0.045	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 5.2\text{ A}$		18		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 1.7\text{ A}, V_{GS} = 0\text{ V}$		0.75	1.2	V
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		700		pF
Output Capacitance	C_{oss}			76		
Reverse Transfer Capacitance	C_{rss}			45		
Total Gate Charge	Q_g	$V_{DS} = 20\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5.2\text{ A}$		8	12	nC
Gate-Source Charge	Q_{gs}			1.5		
Gate-Drain Charge	Q_{gd}			2.4		
Gate Resistance	R_g	$f = 1\text{ MHz}$		1.9	2.9	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$		7	11	ns
Rise Time	t_r			11	17	
Turn-Off Delay Time	$t_{d(off)}$			27	40	
Fall Time	t_f			8	13	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 1.7\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		25	40	nC
Body Diode Reverse Recovery Charge	Q_{rr}			17	26	

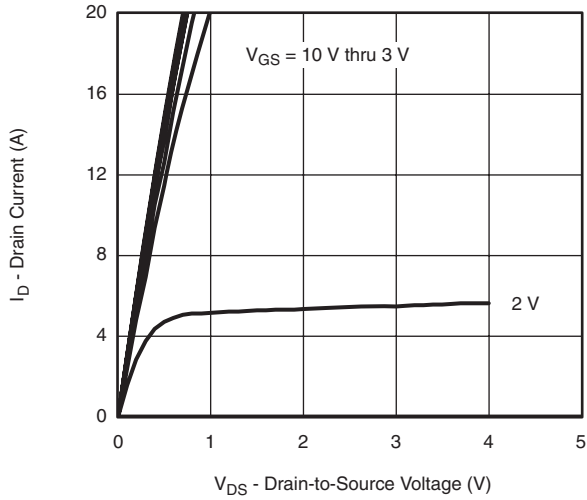
Notes:

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

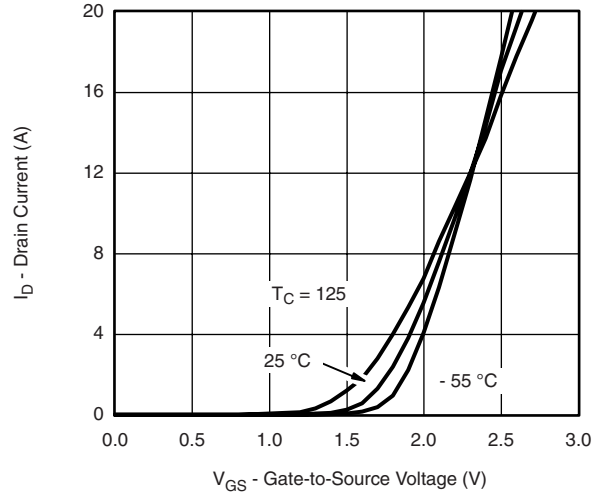
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



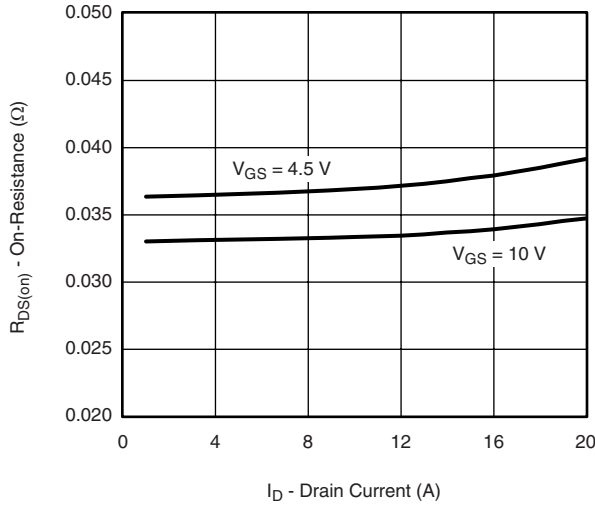
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



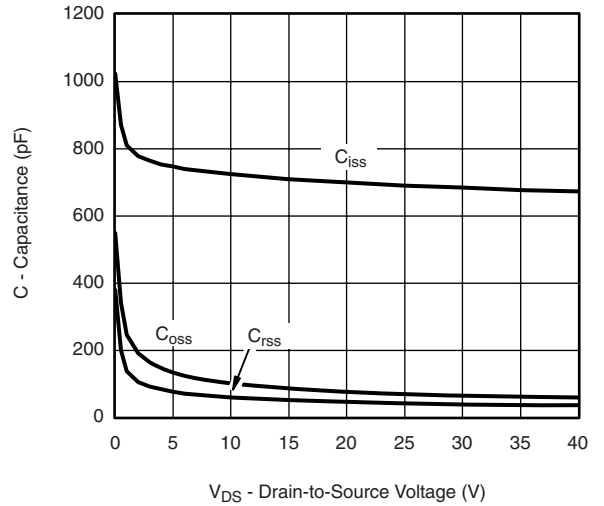
Output Characteristics



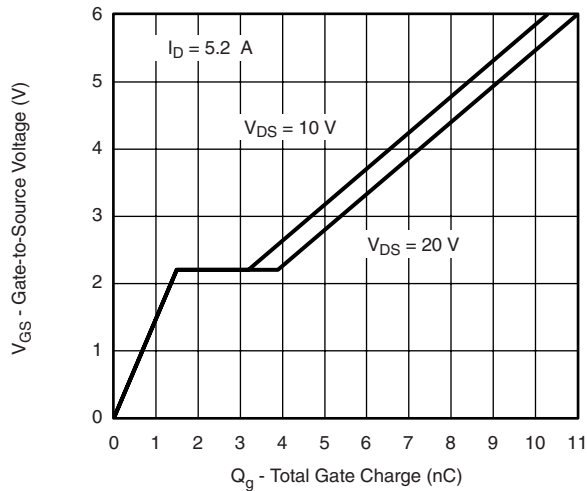
Transfer Characteristics



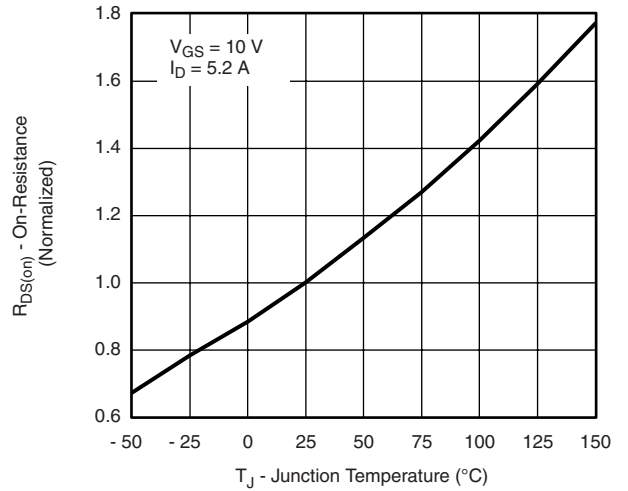
On-Resistance vs. Drain Current



Capacitance



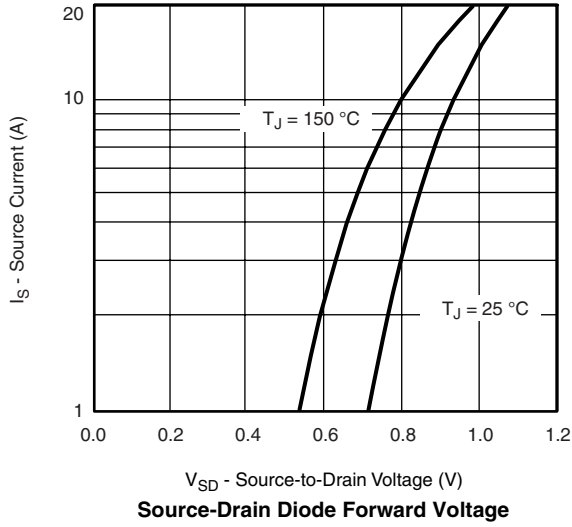
Gate Charge



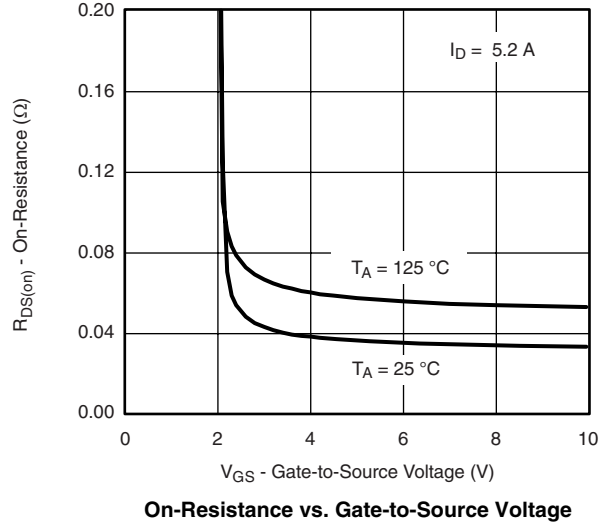
On-Resistance vs. Junction Temperature



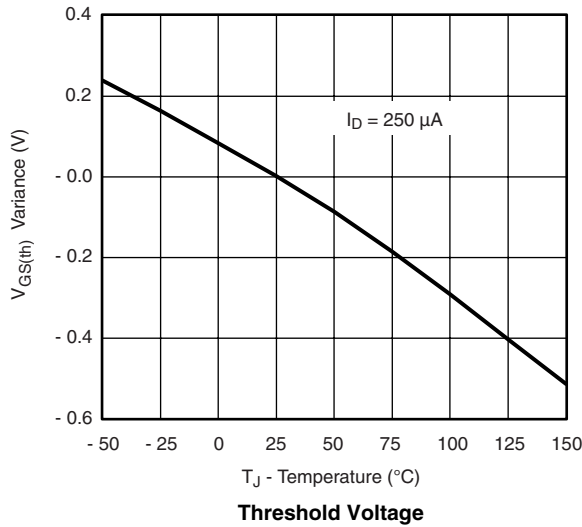
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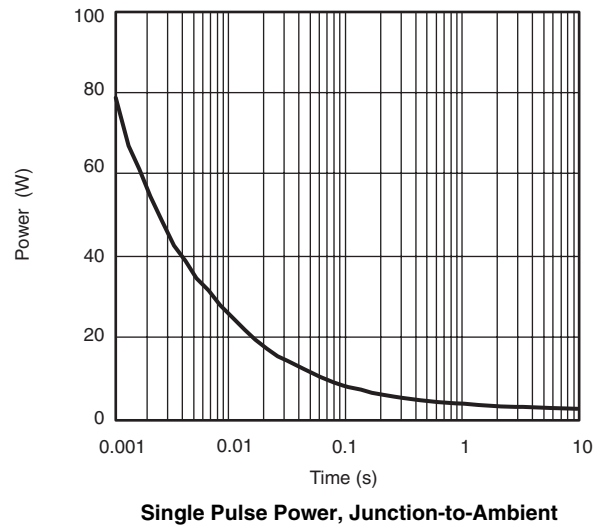
Source-Drain Diode Forward Voltage



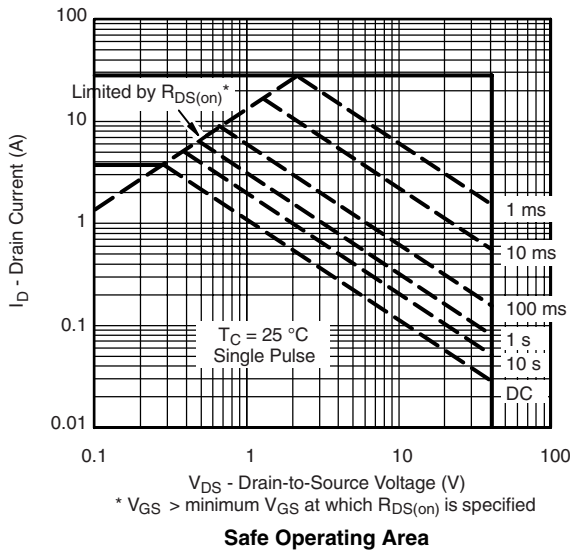
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



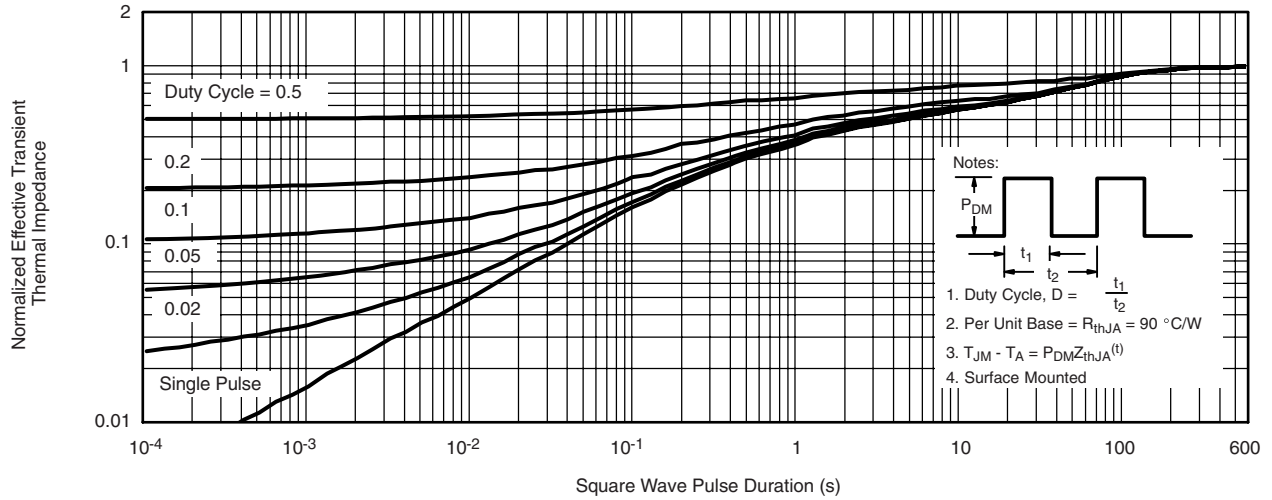
Single Pulse Power, Junction-to-Ambient



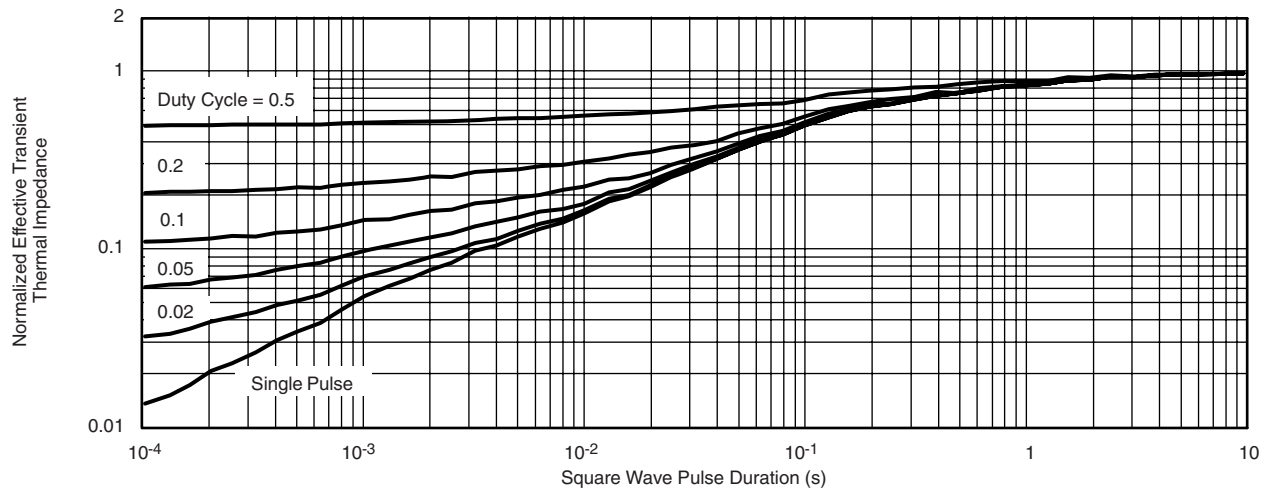
Safe Operating Area



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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