

N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
30	0.011 at $V_{GS} = 10$ V	12
	0.0145 at $V_{GS} = 4.5$ V	9.8

FEATURES

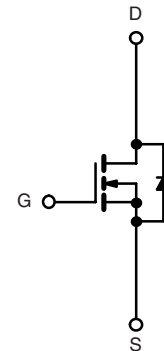
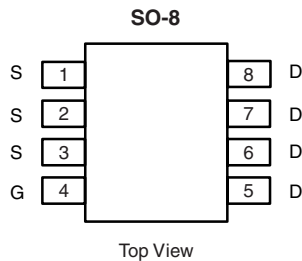
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Notebook PC
 - Core
 - System Power



Ordering Information: Si4688DY-T1-E3 (Lead (Pb)-free)
Si4688DY-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}	30		V
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	12	8.9	A
		9.5	7.1	
Pulsed Drain Current	I_{DM}	40		
Continuous Source Current (Diode Conduction) ^a	I_S	2.3	1.3	
Single Pulse Avalanche Current	I_{AS}	20		mJ
Avalanche Energy	E_{AS}	20		
Maximum Power Dissipation ^a	P_D	2.5	1.4	W
		1.6	0.9	
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}	43	50	°C/W
		73	90	
Maximum Junction-to-Foot (Drain)	R_{thJF}	19	25	

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		3.0	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}	$V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$			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	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 12\text{ A}$		0.009	0.011	Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 9.8\text{ A}$		0.012	0.0145	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 12\text{ A}$		32		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 2.3\text{ A}$, $V_{GS} = 0\text{ V}$		0.76	1.1	V
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		1580		pF
Output Capacitance	C_{oss}			295		
Reverse Transfer Capacitance	C_{rss}			140		
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}$, $V_{GS} = 5\text{ V}$, $I_D = 12\text{ A}$		13.2	20	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 15\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 12\text{ A}$		25.4	38	
Gate-Drain Charge	Q_{gd}			5.3		
Gate Resistance	R_g		0.9	1.8	2.7	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \approx 1\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 6\text{ }\Omega$		13	20	ns
Rise Time	t_r			10	15	
Turn-Off Delay Time	$t_{d(off)}$			33	50	
Fall Time	t_f			10	15	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 2.3\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$		25	40	

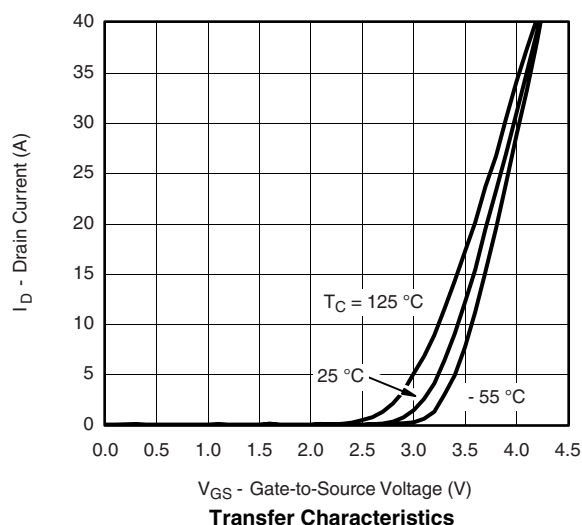
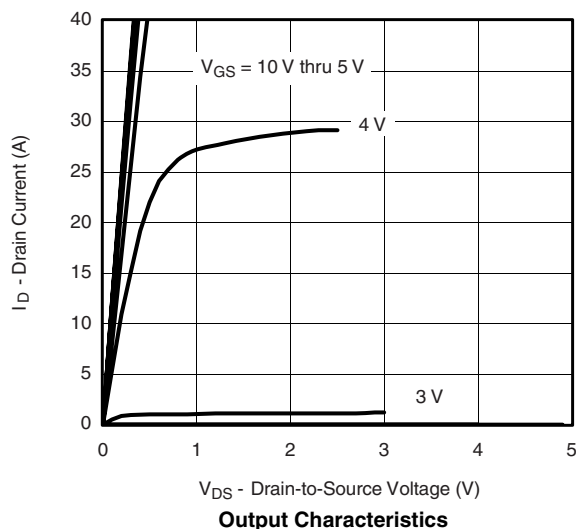
Notes:

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

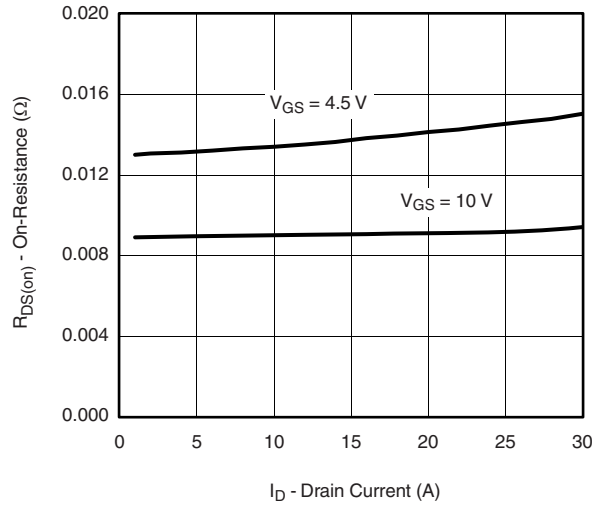
b. Guaranteed by design, not subject to production testing.

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.

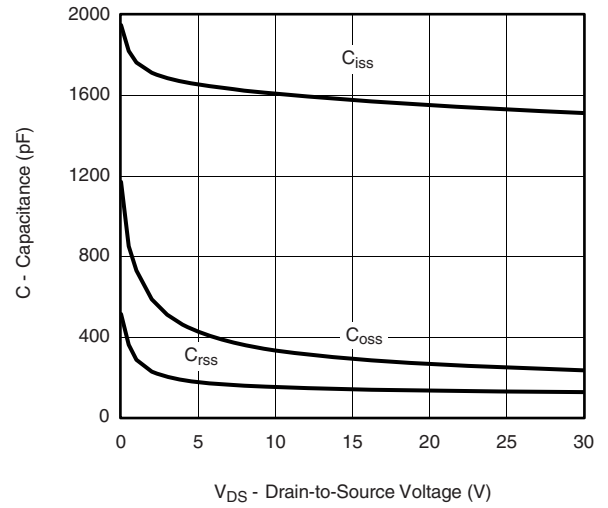
TYPICAL CHARACTERISTICS $25\text{ }^{\circ}\text{C}$, unless otherwise noted



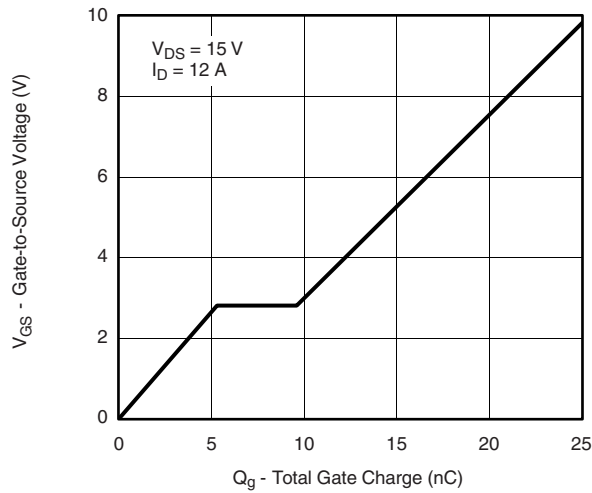
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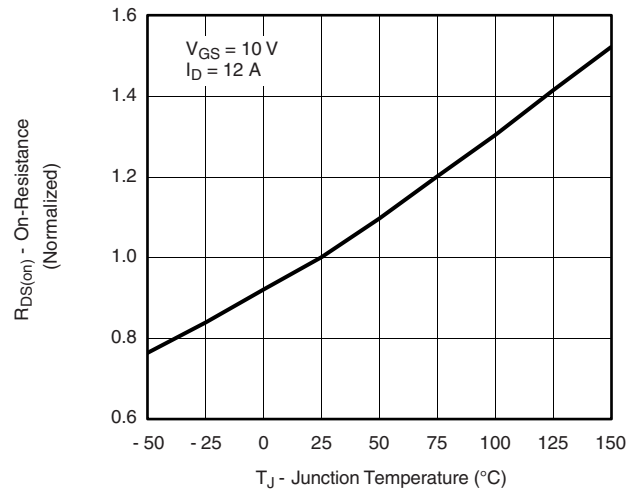
On-Resistance vs. Drain Current



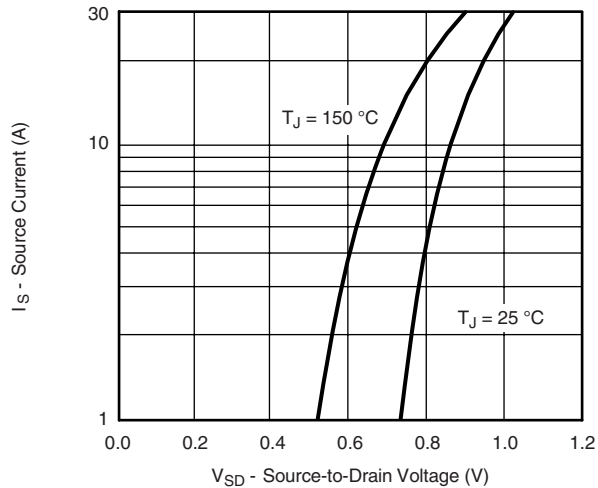
Capacitance



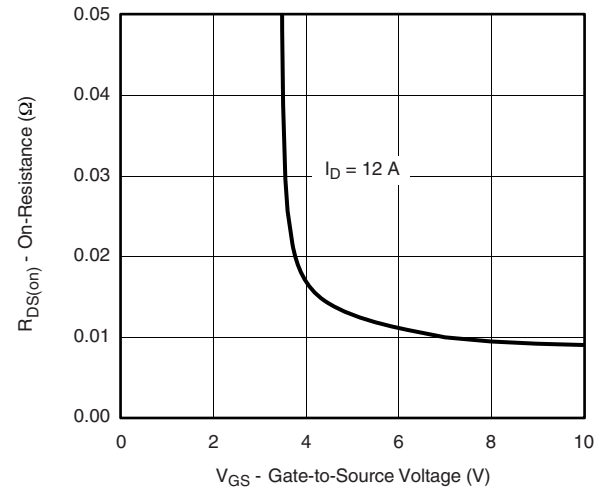
Gate Charge



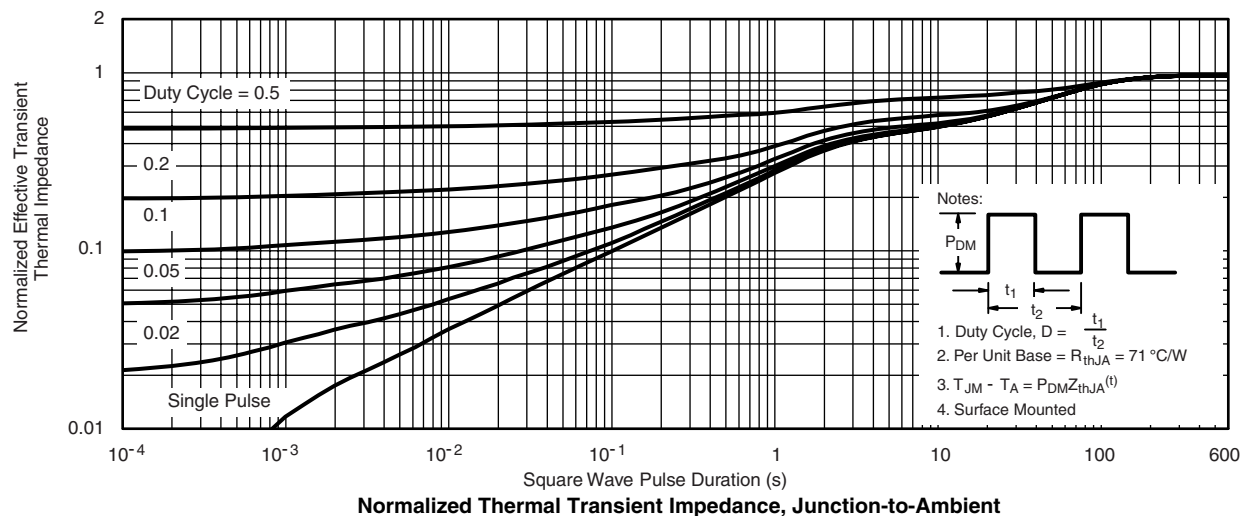
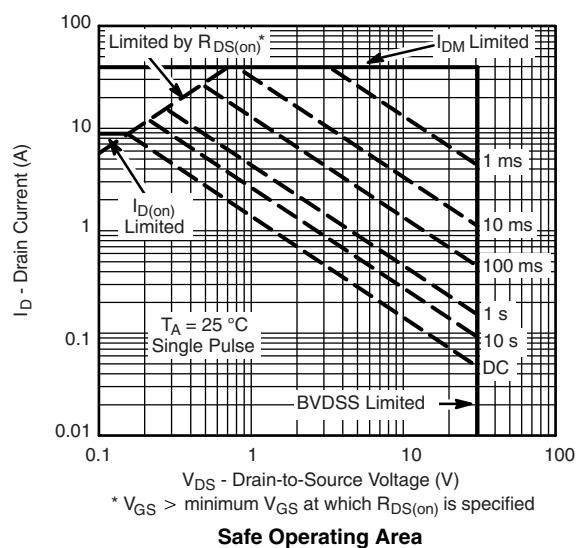
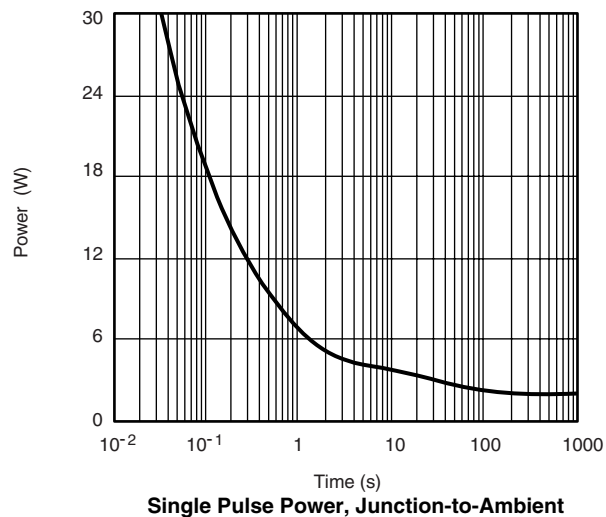
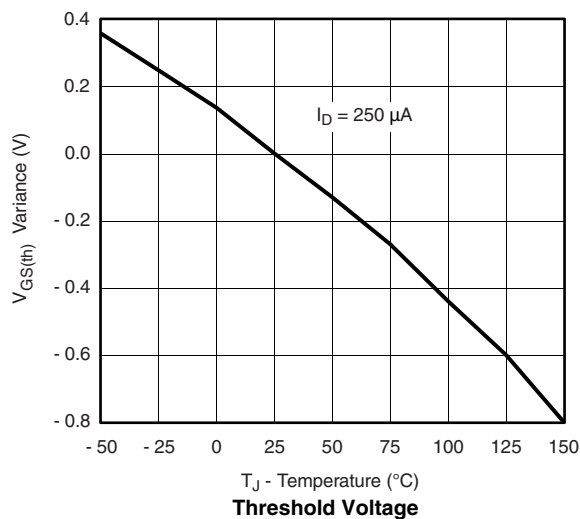
On-Resistance vs. Junction Temperature



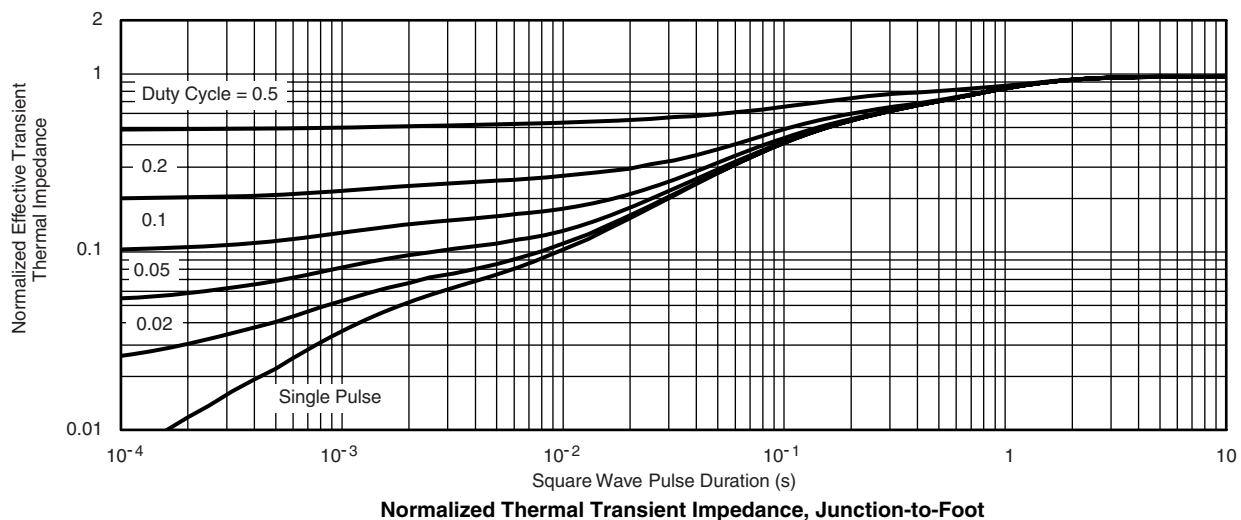
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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