

N-Channel Reduced Q_g , Fast Switching MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
20	0.0028 at $V_{GS} = 10$ V	25
	0.0040 at $V_{GS} = 4.5$ V	22

FEATURES

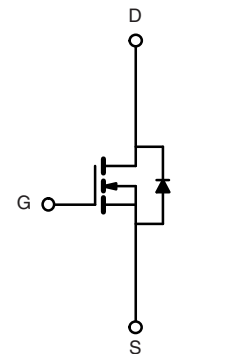
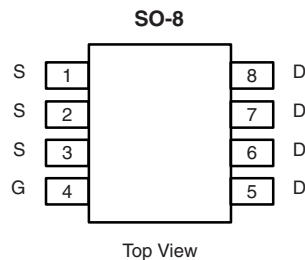
- Halogen-free According to IEC 61249-2-21 Definition
- Extremely Low Q_{gd} for Switching Losses
- Ultra-Low On-Resistance
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Synchronous Rectifier in Low Power DC/DC Converters
- POL
- OR-ing



N-Channel MOSFET

Ordering Information: Si4398DY-T1-E3 (Lead (Pb)-free)
Si4398DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	10 s	Steady State	Unit
Drain-Source Voltage	V_{DS}	20		V
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	I_D	25	19	A
		20	13	
Pulsed Drain Current (10 μs Pulse Width)	I_{DM}	70		
Continuous Source Current (Diode Conduction) ^a	I_S	2.9	1.3	
Avalanche Current	I_{AS}	40		mJ
Single Pulse Avalanche Energy	E_{AS}	80		
Maximum Power Dissipation ^a	P_D	3.5	1.6	W
		2.2	1.0	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150		$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	R_{thJA}	29	35	$^\circ\text{C/W}$
		67	80	
Maximum Junction-to-Foot (Drain)	R_{thJF}	13	16	

Notes:

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

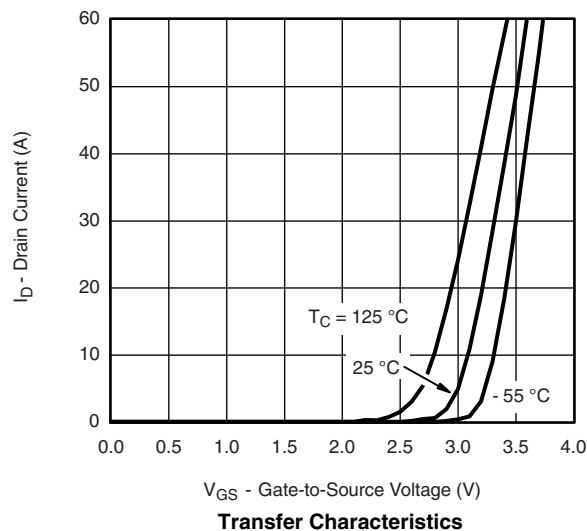
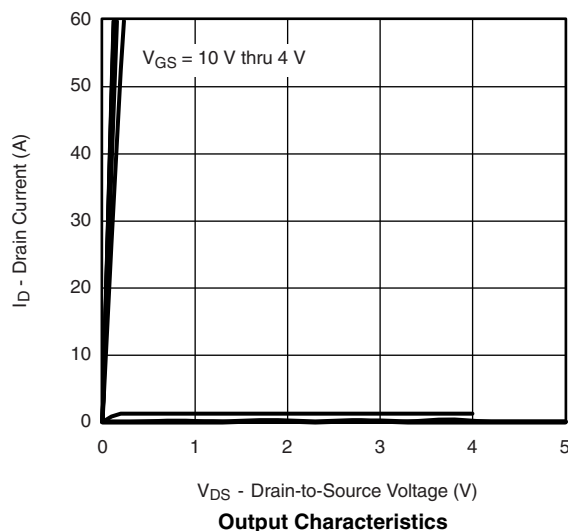
SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1.0		3.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 12\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^{\circ}\text{C}$			5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	50			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 25\text{ A}$		0.0023	0.0028	Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 22\text{ A}$		0.0033	0.0040	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}$, $I_D = 15\text{ A}$		95		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 2.9\text{ A}$, $V_{GS} = 0\text{ V}$		0.72	1.1	V
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		5620		pF
Output Capacitance	C_{oss}			1340		
Reverse Transfer Capacitance	C_{rss}			540		
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 20\text{ A}$		34	50	nC
Gate-Source Charge	Q_{gs}			17.5		
Gate-Drain Charge	Q_{gd}			7.5		
Gate Resistance	R_g		0.7	1.4	2.1	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}$, $R_L = 10\text{ }\Omega$ $I_D \cong 1\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 6\text{ }\Omega$		23	35	ns
Rise Time	t_r			15	23	
Turn-Off Delay Time	$t_{d(off)}$			80	120	
Fall Time	t_f			23	35	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 2.9\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$		50	80	

Notes:

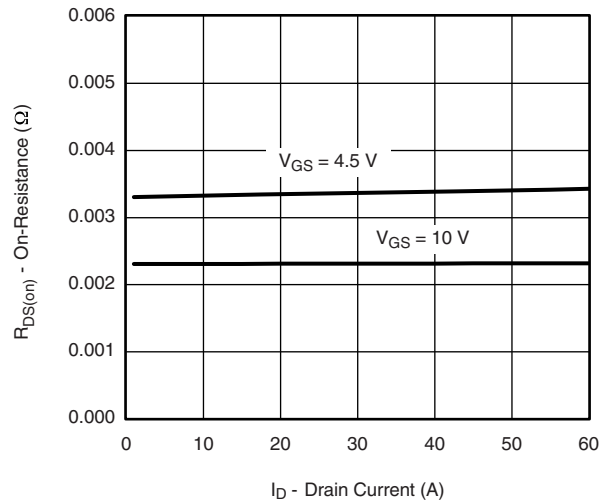
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

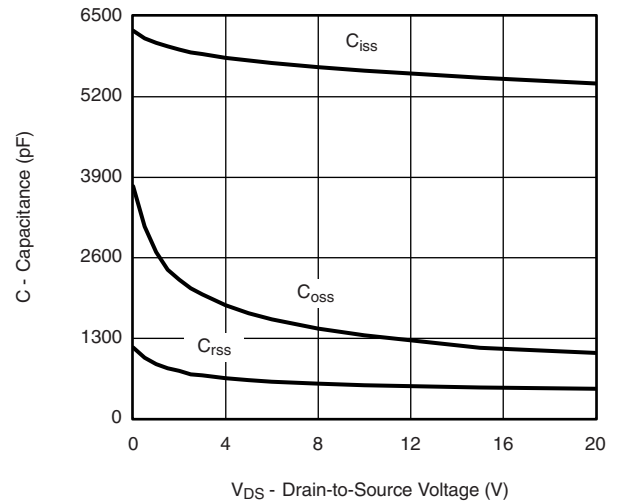
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

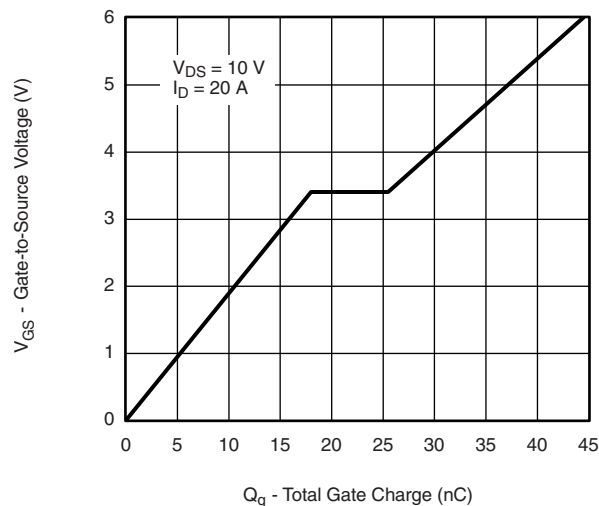
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



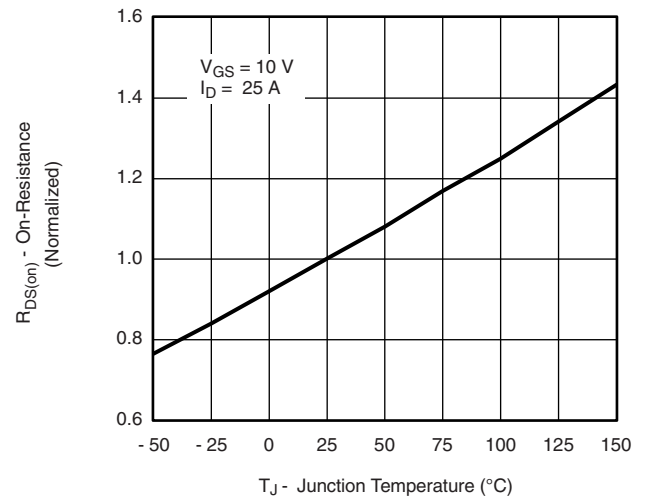
On-Resistance vs. Drain Current



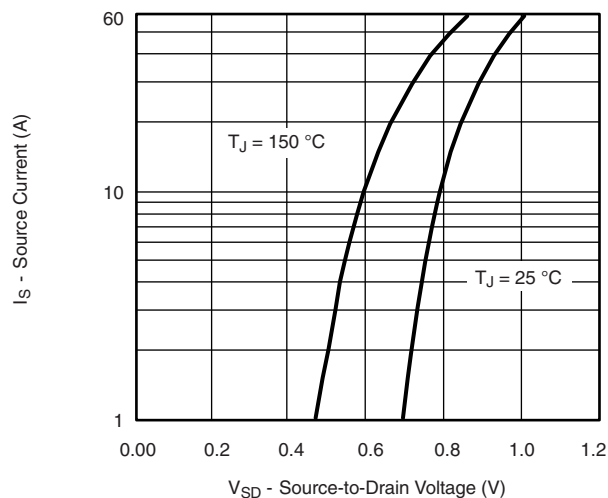
Capacitance



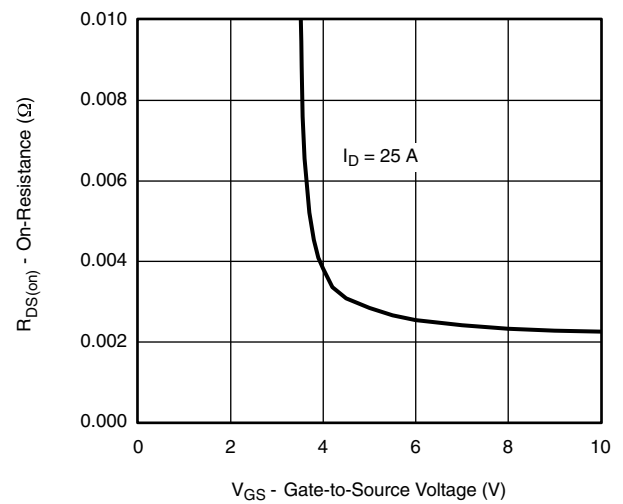
Gate Charge



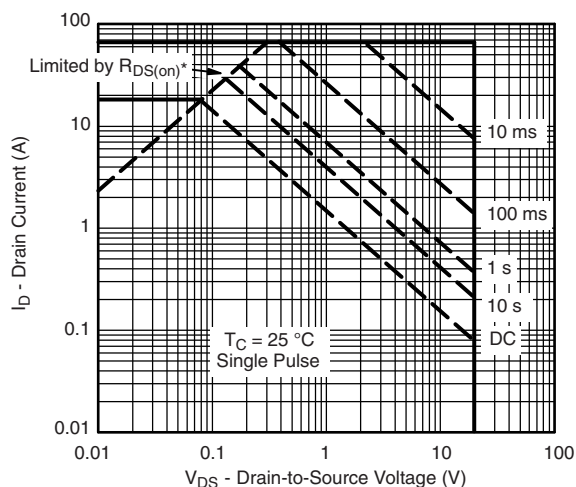
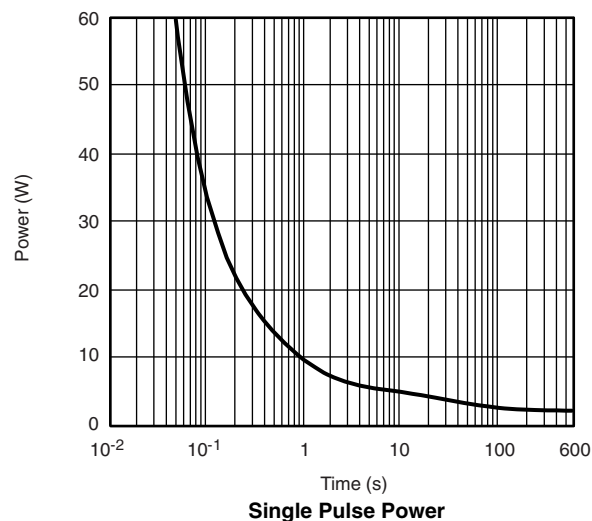
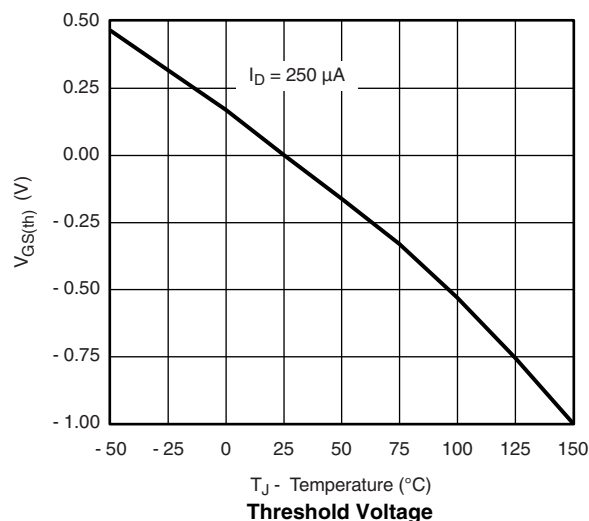
On-Resistance vs. Junction Temperature



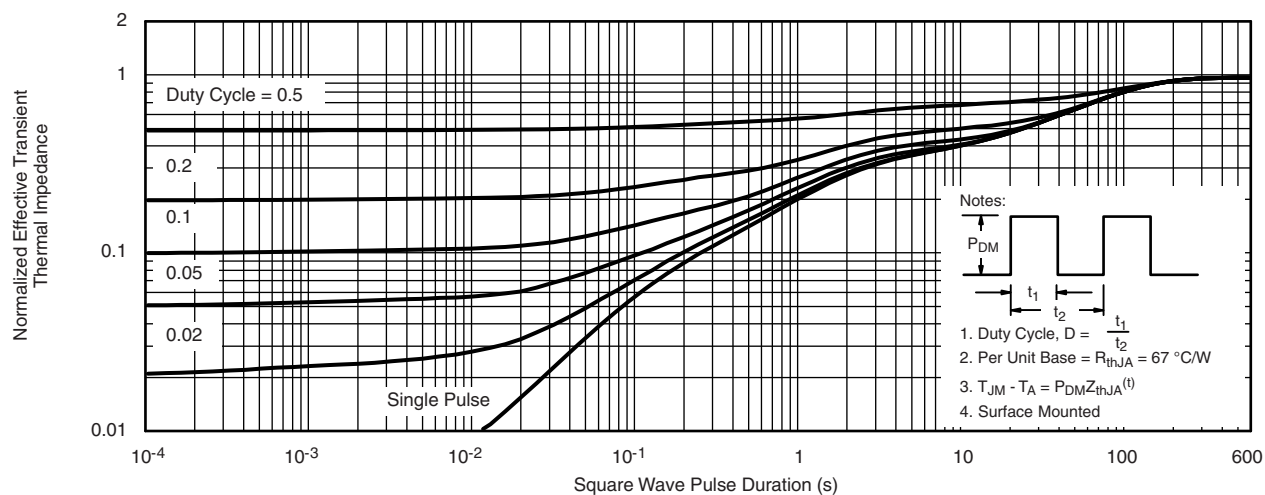
Source-Drain Diode Forward Voltage



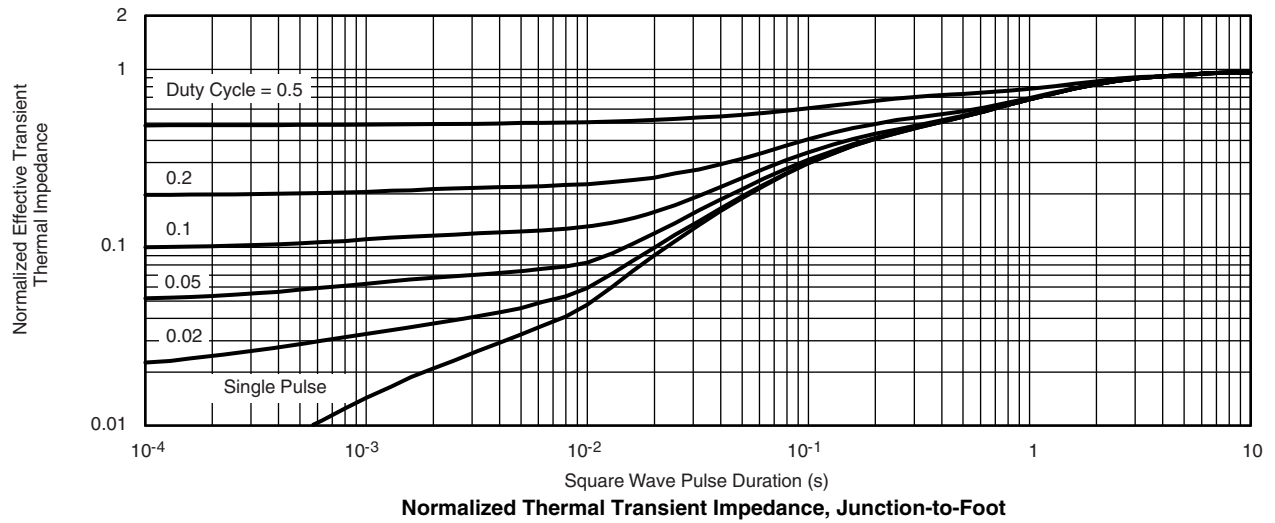
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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