

N-Channel Reduced Q_{gd} , Fast Switching WFET™

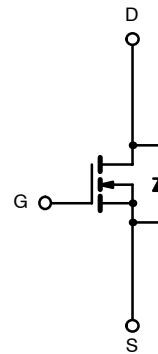
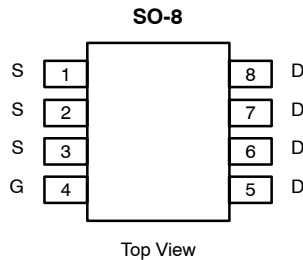
PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
30	0.00825 @ $V_{GS} = 10$ V	15
	0.00975 @ $V_{GS} = 4.5$ V	14

FEATURES

- Extremely Low Q_{gd} WFET™ Technology for Switching Losses
- TrenchFET® Power MOSFET
- 100% R_g Tested

APPLICATIONS

- High-Side DC/DC Conversion
 - Notebook
 - Server
- Synchronous Rectification



N-Channel MOSFET

Ordering Information: Si4394DY—E3 (Lead Free)
Si4394DY-T1—E3 (Lead Free with Tape and Reel)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	10 secs	Steady State	Unit	
Drain-Source Voltage	V_{DS}	30		V	
Gate-Source Voltage	V_{GS}	± 12			
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	I_D	$T_A = 25^\circ\text{C}$	15	10	A
		$T_A = 70^\circ\text{C}$	12	8	
Pulsed Drain Current (10 μs Pulse Width)	I_{DM}	50			
Continuous Source Current (Diode Conduction) ^a	I_S	2.7	1.3		
Avalanch Current	i_{AS}	45			
Maximum Power Dissipation ^a	P_D	$T_A = 25^\circ\text{C}$	2.7	1.4	W
		$T_A = 70^\circ\text{C}$	1.9	0.9	
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}	$t \leq 10$ sec	32	42	$^\circ\text{C/W}$
		Steady State	68	90	
Maximum Junction-to-Foot (Drain)	R_{thJF}	16	20		

Notes

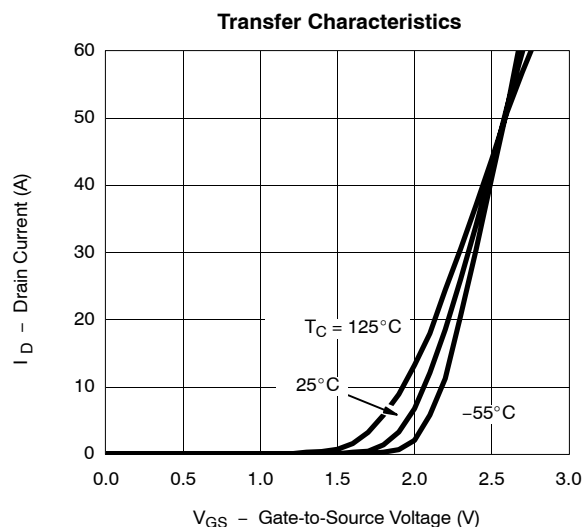
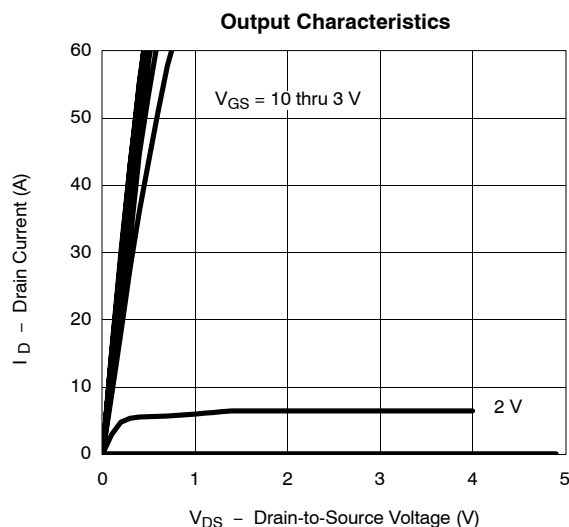
a. Surface Mounted on 1" x 1" FR4 Board.

SPECIFICATIONS (T_J = 25 °C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.6		1.8	V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±12 V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			1	μA
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C			5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	30			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 15 A		0.0066	0.00825	Ω
		V _{GS} = 4.5 V, I _D = 14 A		0.0077	0.00975	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 15 A		65		S
Diode Forward Voltage ^a	V _{SD}	I _S = 2.9 A, V _{GS} = 0 V		0.73	1.1	V
Dynamic^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		1900		pF
Output Capacitance	C _{oss}			530		
Reverse Transfer Capacitance	C _{rss}			120		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 15 A		12.5		nC
Gate-Source Charge	Q _{gs}			3.9		
Gate-Drain Charge	Q _{gd}			2.1		
Gate Resistance	R _g	f = 1 MHz	0.8	1.2	1.8	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 15 Ω I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 6 Ω		13	20	ns
Rise Time	t _r			8	13	
Turn-Off Delay Time	t _{d(off)}			48	75	
Fall Time	t _f			13	20	
Source-Drain Reverse Recovery Time	t _{rr}		I _F = 2.9 A, di/dt = 100 A/μs		36	

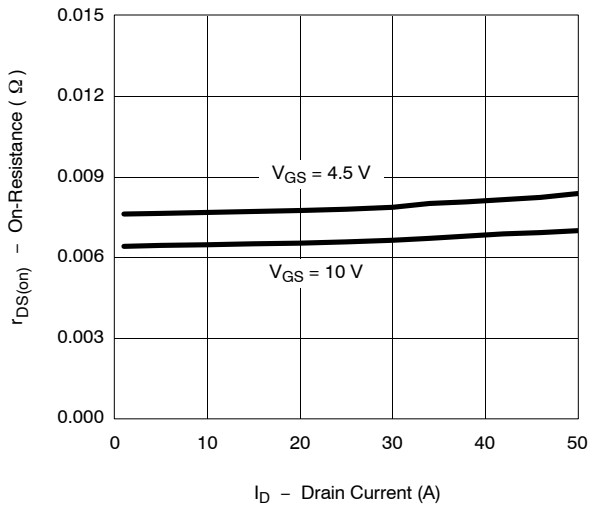
Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

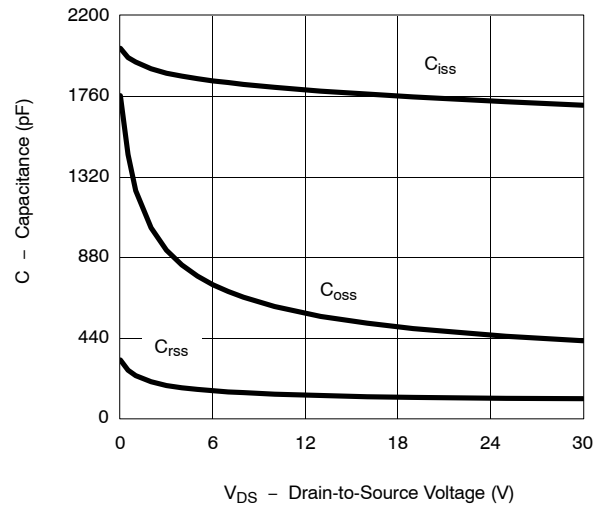
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

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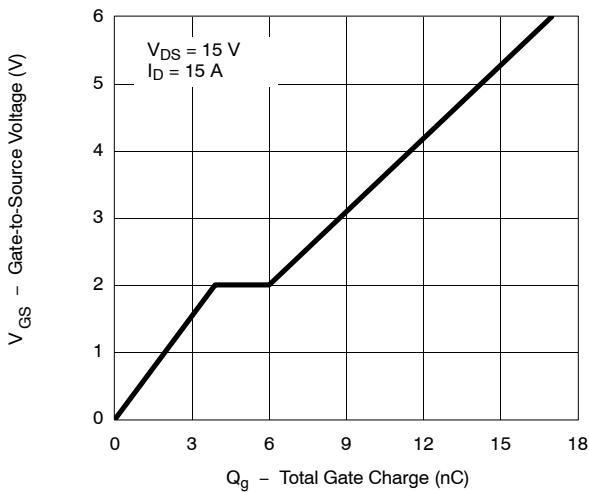
On-Resistance vs. Drain Current



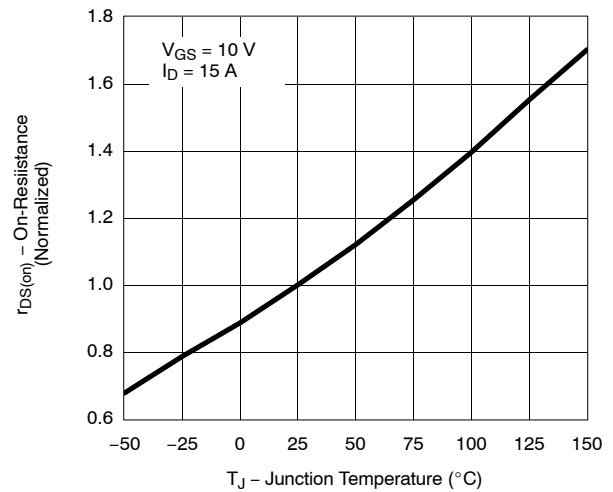
Capacitance



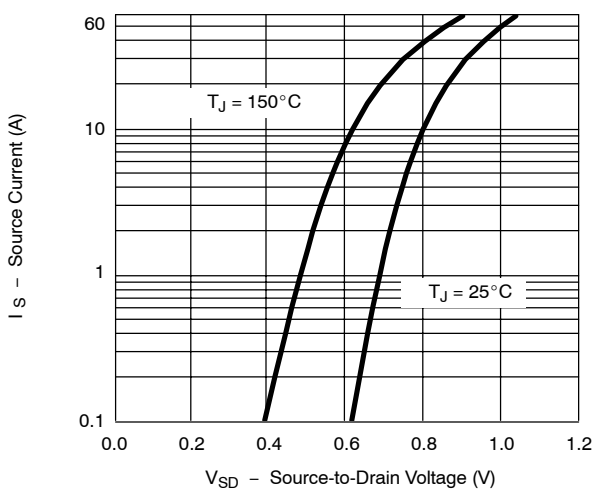
Gate Charge



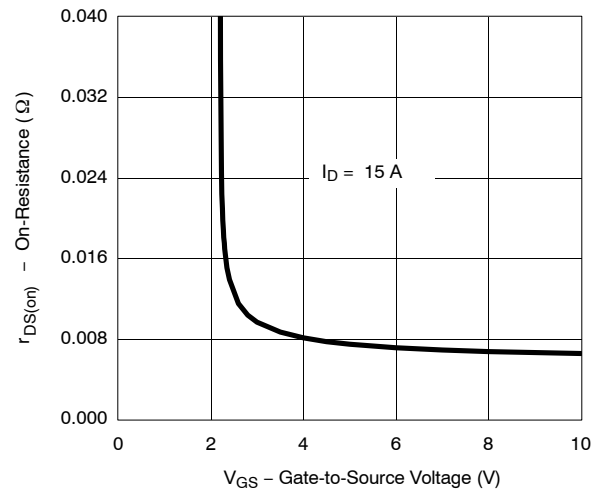
On-Resistance vs. Junction Temperature



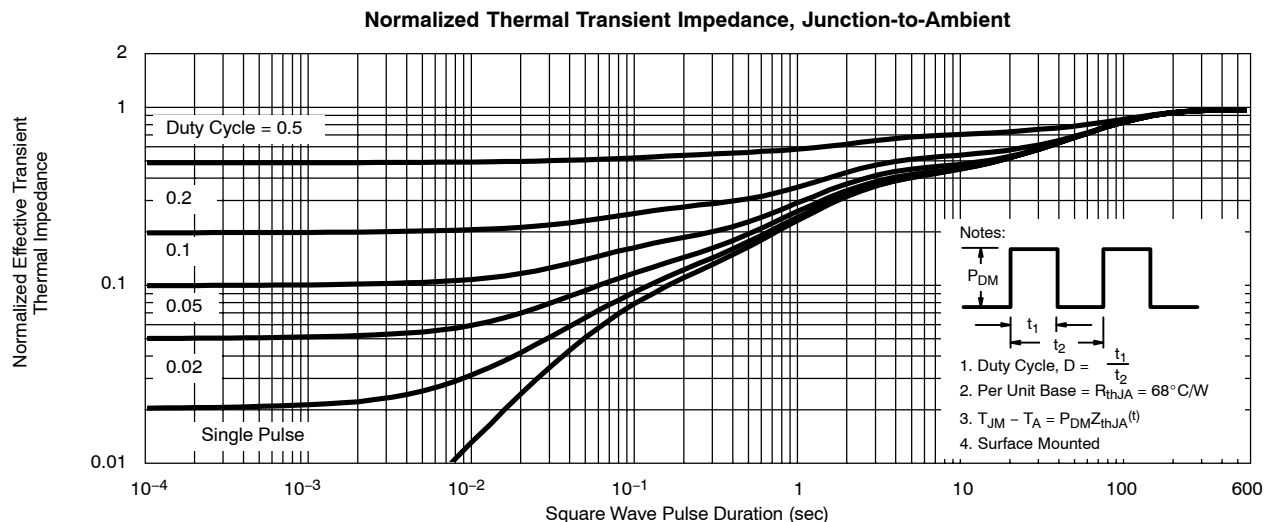
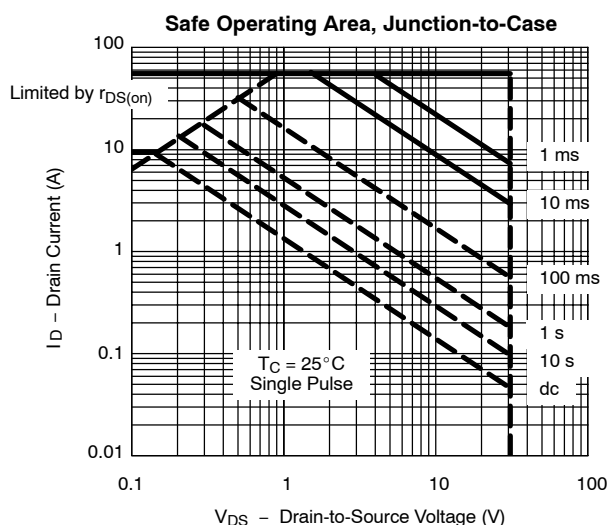
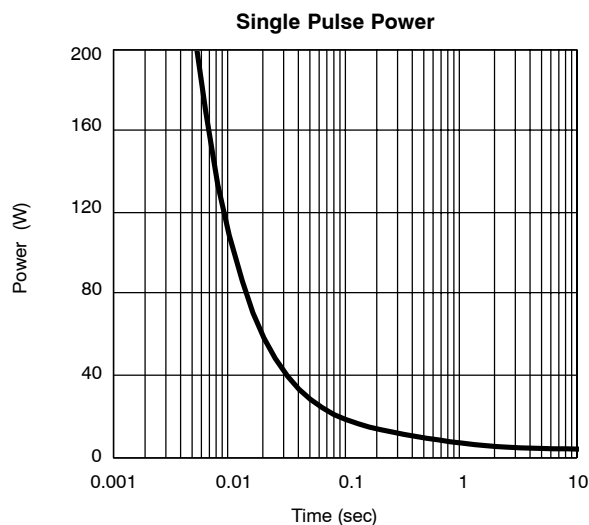
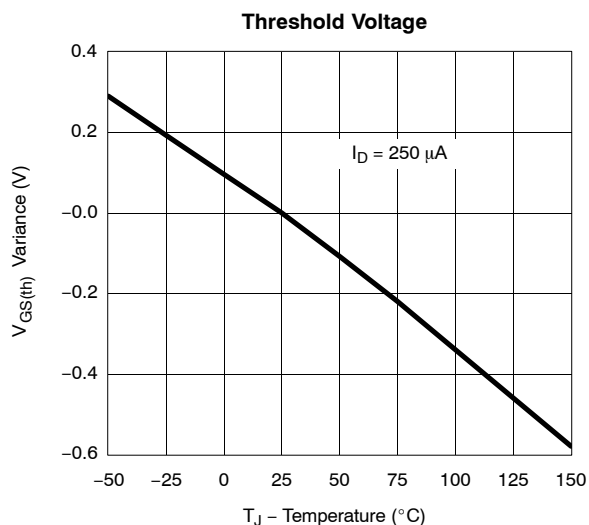
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)





TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

