



## N-Channel 20-V (D-S) MOSFET

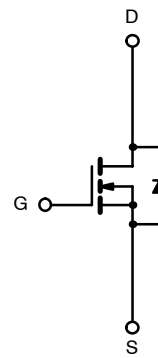
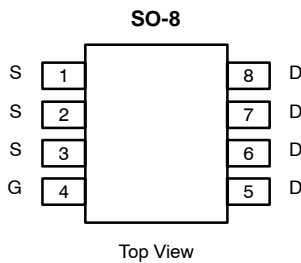
PRODUCT SUMMARY		
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
20	0.0027 @ V <sub>GS</sub> = 4.5 V	25
	0.0042 @ V <sub>GS</sub> = 2.5 V	22

### FEATURES

- Ultra Low On-Resistance Using High Density TrenchFET® Gen II Power MOSFET Technology
- Q<sub>g</sub> Optimized
- 100% R<sub>g</sub> Tested

### APPLICATIONS

- Synchronous Rectification
- Point-Of-Load



Ordering Information: Si4378DY—E3  
Si4378DY-T1—E3 (with Tape and Reel)

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)					
Parameter		Symbol	10 secs	Steady State	Unit
Drain-Source Voltage		V <sub>DS</sub>	20		V
Gate-Source Voltage		V <sub>GS</sub>	± 12		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	T <sub>A</sub> = 25 °C	I <sub>D</sub>	25	19	A
	T <sub>A</sub> = 70 °C		20	13	
Pulsed Drain Current (10 μs Pulse Width)		I <sub>DM</sub>	70		
Continuous Source Current (Diode Conduction) <sup>a</sup>		I <sub>S</sub>	2.9	1.3	
Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	40		
Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> = 25 °C	P <sub>D</sub>	3.5	1.6	W
	T <sub>A</sub> = 70 °C		2.2	1	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to 150		°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	t ≤ 10 sec	R <sub>thJA</sub>	29	35	°C/W
	Steady State		67	80	
Maximum Junction-to-Foot (Drain)	Steady State	R <sub>thJF</sub>	13	16	

Notes

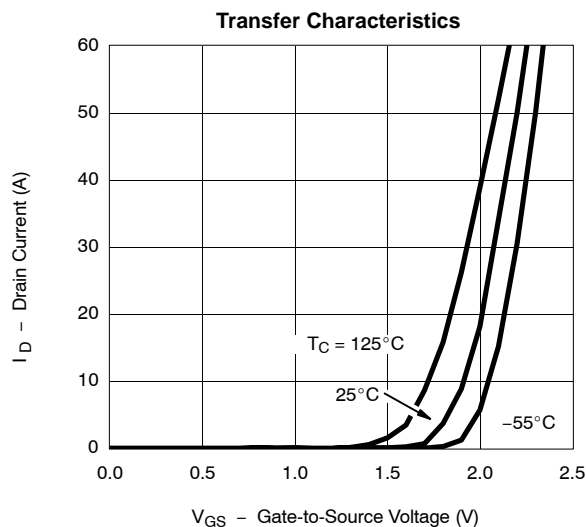
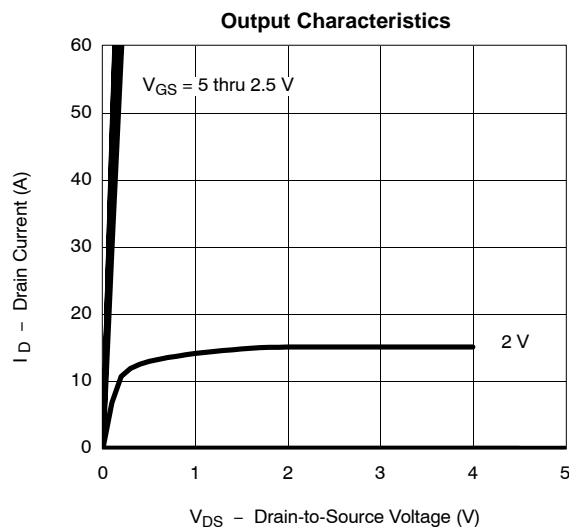
a. Surface Mounted on 1" x 1" FR4 Board.

**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.6		1.8	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			5	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 4.5 V	30			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 25 A		0.0022	0.0027	Ω
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 22 A		0.0034	0.0042	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 25 A		150		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = 2.9 A, V <sub>GS</sub> = 0 V		0.72	1.1	V
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz		8500		pF
Output Capacitance	C <sub>oss</sub>			1250		
Reverse Transfer Capacitance	C <sub>rss</sub>			650		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 25 A		55		nC
Gate-Source Charge	Q <sub>gs</sub>			16		
Gate-Drain Charge	Q <sub>gd</sub>			10		
Gate Resistance	R <sub>g</sub>		0.8	1.3	2.0	Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 10 Ω I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 6 Ω		85	130	ns
Rise Time	t <sub>r</sub>			65	100	
Turn-Off Delay Time	t <sub>d(off)</sub>			140	210	
Fall Time	t <sub>f</sub>			50	80	
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 2.9 A, di/dt = 100 A/μs		50	80	

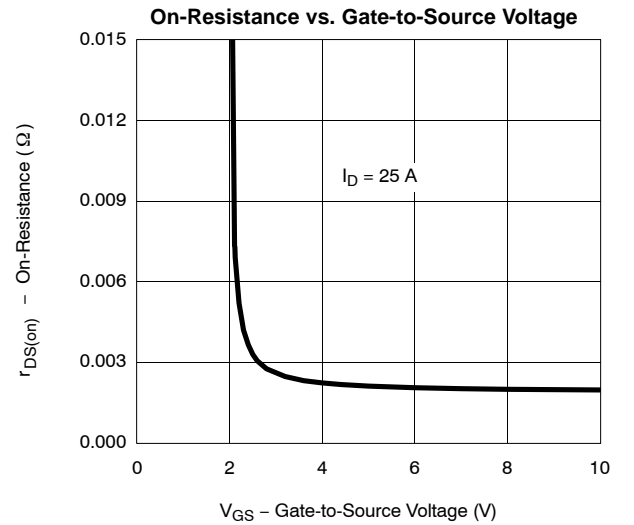
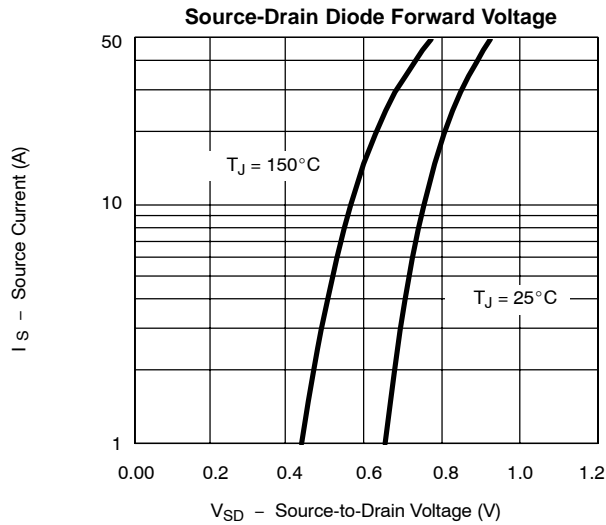
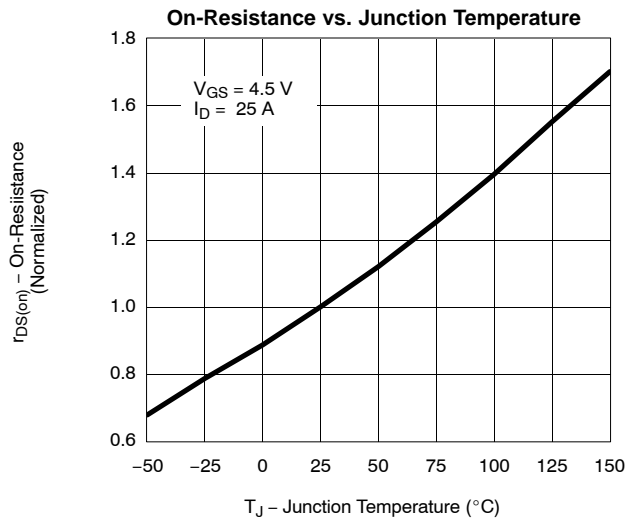
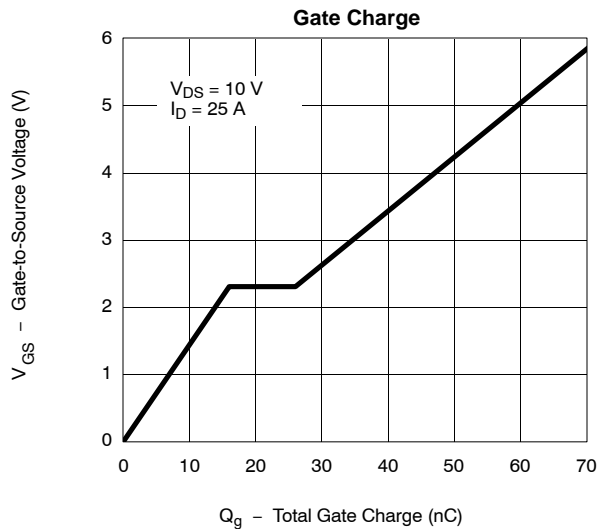
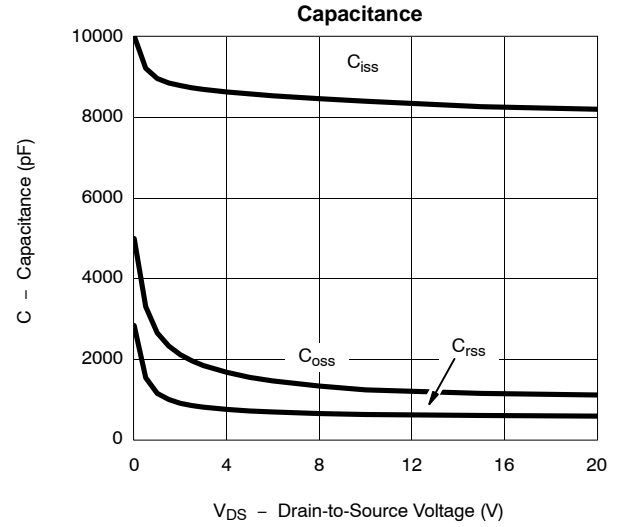
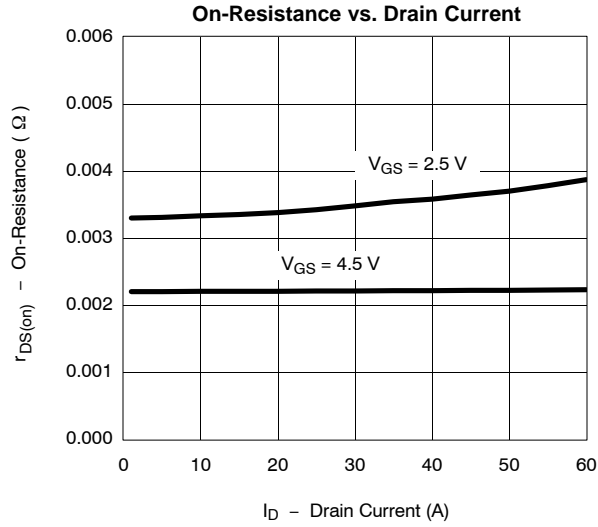
## Notes

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

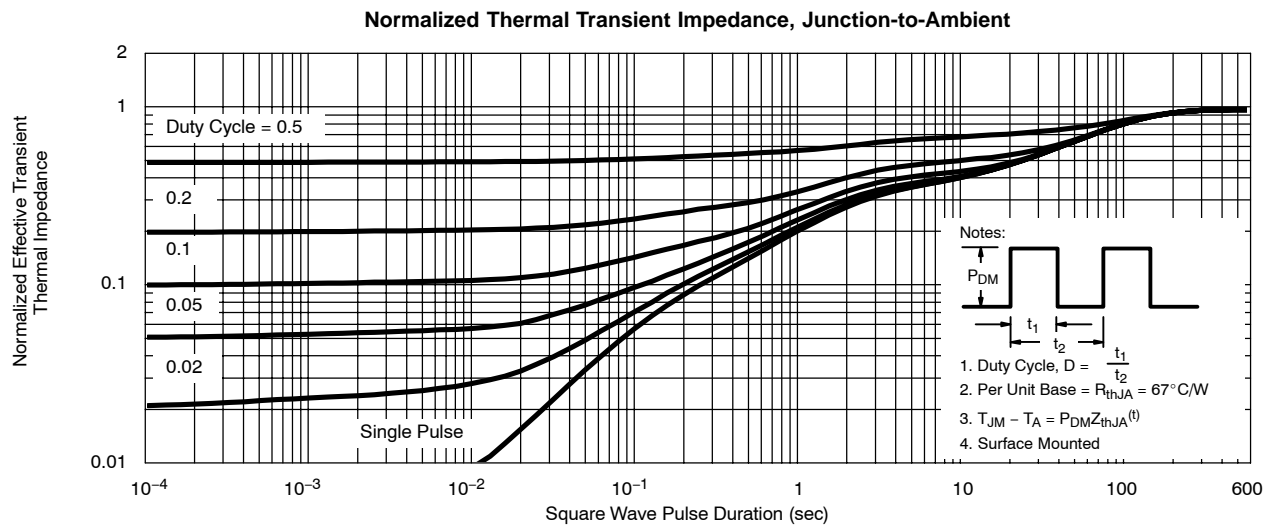
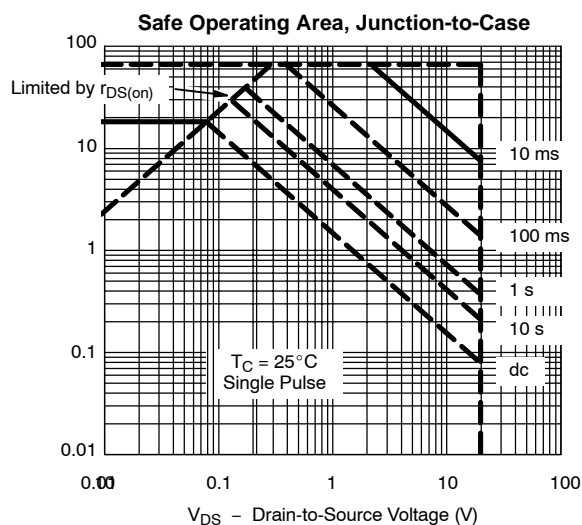
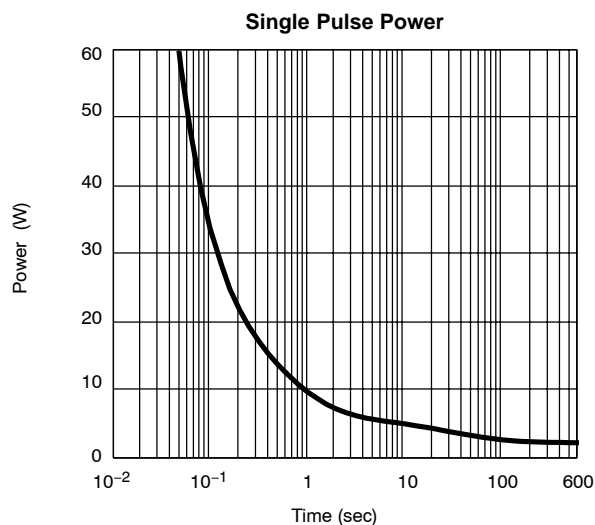
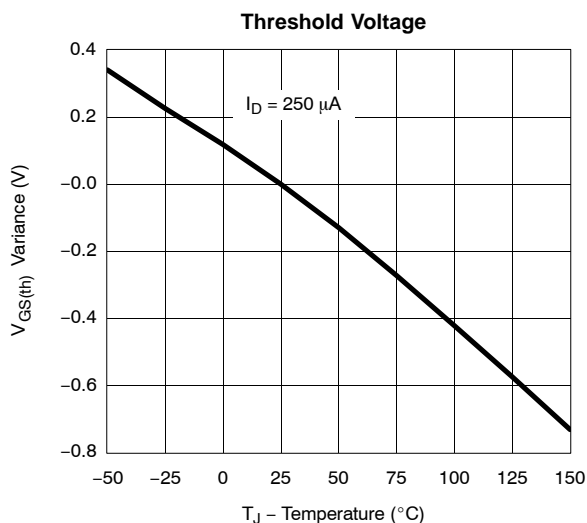
**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**



**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**





**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

