

N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
20	0.85 at $V_{GS} = 4.5$ V	0.4	0.335
	1.08 at $V_{GS} = 2.5$ V	0.35	

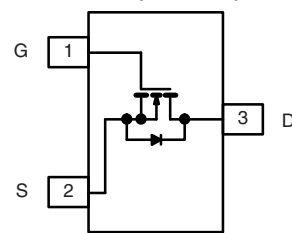
FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



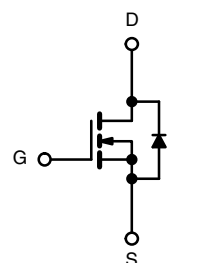
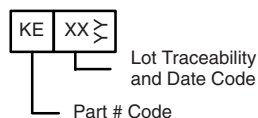
RoHS
COMPLIANT
HALOGEN
FREE
Available

SC-70 (3-LEADS)



Top View

Marking Code



N-Channel MOSFET

Ordering Information: Si1300BDL-T1-E3 (Lead (Pb)-free)
Si1300BDL-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 8	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	0.4	A
	$T_C = 70$ °C	0.32	
	$T_A = 25$ °C	0.37 ^{b, c}	
	$T_A = 70$ °C	0.30 ^{b, c}	
Pulsed Drain Current	I_{DM}	0.5	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	0.18	
	$T_A = 25$ °C	0.14 ^{b, c}	
Maximum Power Dissipation	$T_C = 25$ °C	0.2	W
	$T_C = 70$ °C	0.14	
	$T_A = 25$ °C	0.19	
	$T_A = 70$ °C	0.12 ^{b, c}	
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 ^{b, d}	R_{thJA}	540	670	°C/W
Maximum Junction-to-Foot (Drain)	R_{thJF}	450	570	

Notes:

a. Based on $T_C = 25$ °C.

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

c. $t = 5$ s.

d. Maximum under steady state conditions is 360 °C/W.

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		20		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 2.8		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.4		1.0	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			100	nA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C			5	μA
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 4.5 V	0.4			A
		V _{DS} ≥ 5 V, V _{GS} = 2.5 V	0.12			
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 0.25		0.65	0.85	Ω
		V _{GS} = 2.5 V, I _D = 0.15		0.85	1.08	
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		35		pF
Output Capacitance	C _{oss}			13		
Reverse Transfer Capacitance	C _{rss}			4		
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 0.4		560	840	pC
		V _{DS} = 10 V, V _{GS} = 2.5 V, I _D = 0.35		335	503	
Gate-Source Charge	Q _{gs}			98		
Gate-Drain Charge	Q _{gd}			85		
Gate Resistance	R _g	f = 1 MHz	1.5	7	12	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 25 Ω I _D ≅ 0.4 A, V _{GEN} = 4.5 V, R _g = 1 Ω		7	12	ns
Rise Time	t _r			10	15	
Turn-Off Delay Time	t _{d(off)}			8	13	
Fall Time	t _f			7	12	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			0.18	A
Pulse Diode Forward Current ^a	I _{SM}				0.4	
Body Diode Voltage	V _{SD}	I _S = 0.05 A		0.7	1.2	V

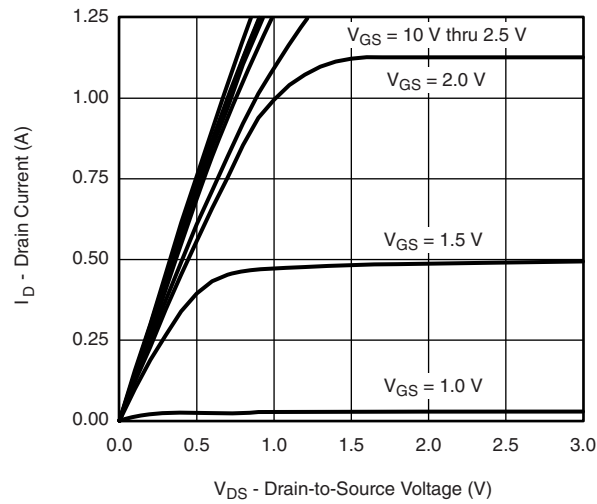
Notes:

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

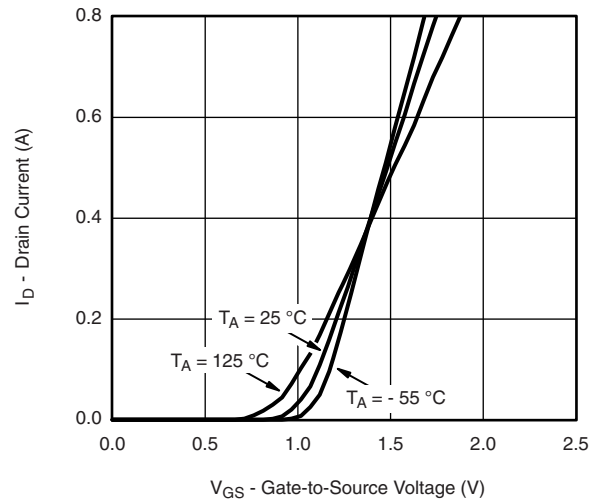
b. Guaranteed by design, not subject to production testing.

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.

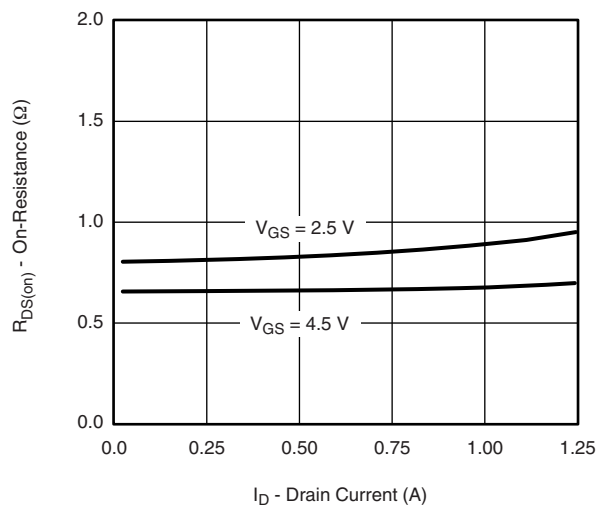
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



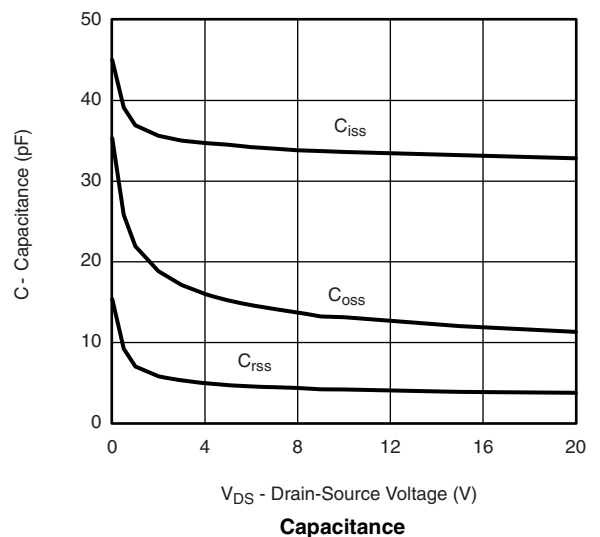
Output Characteristics



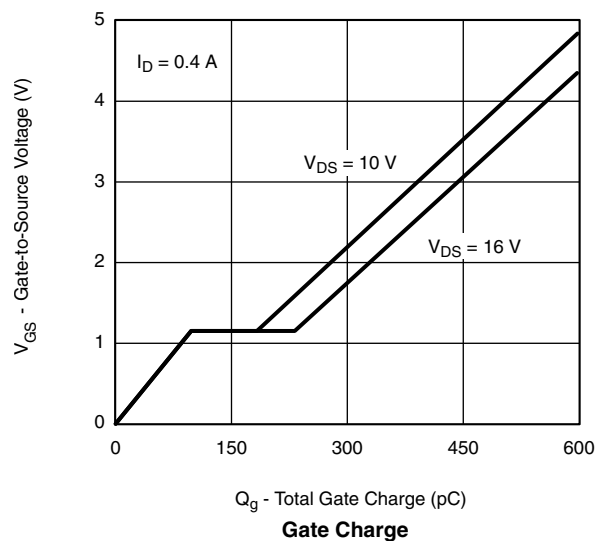
Transfer Characteristics Curves vs. Temperature



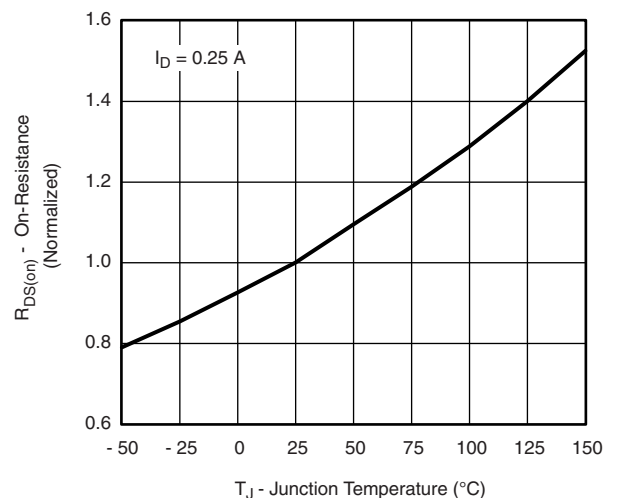
On-Resistance vs. Drain Current



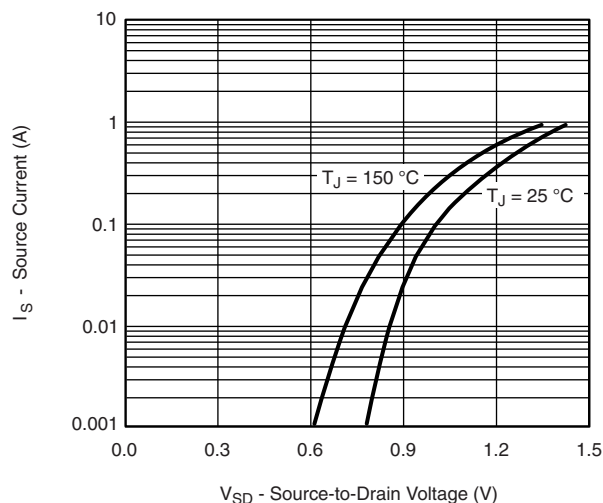
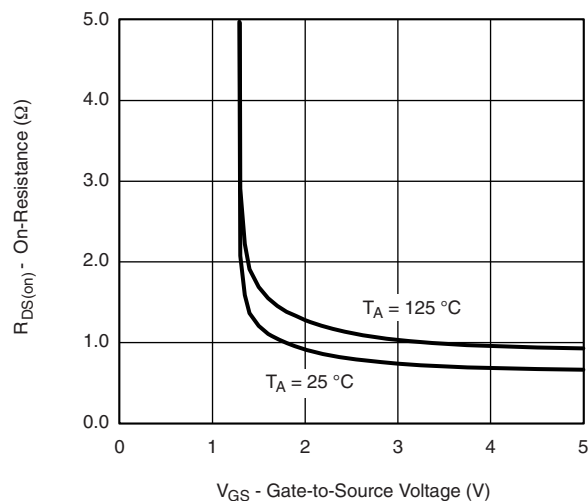
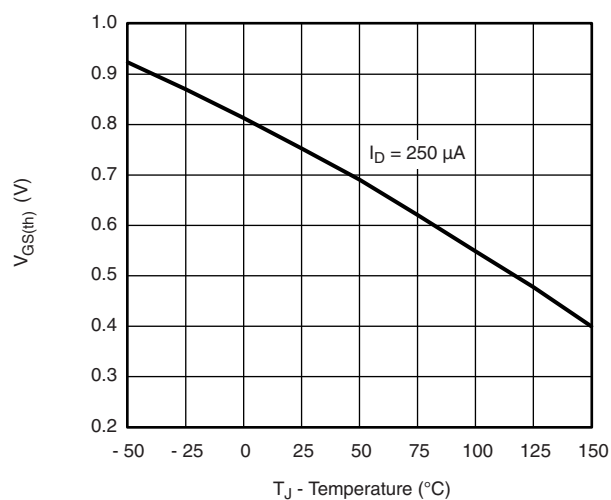
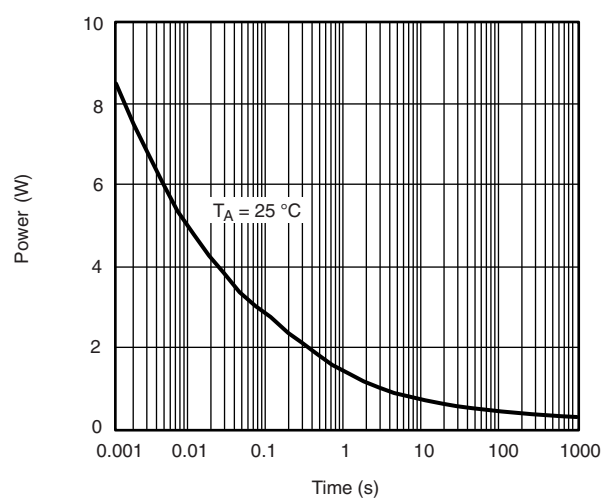
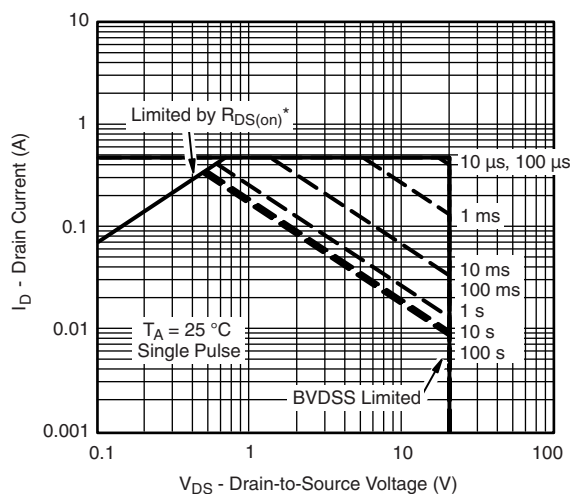
Capacitance



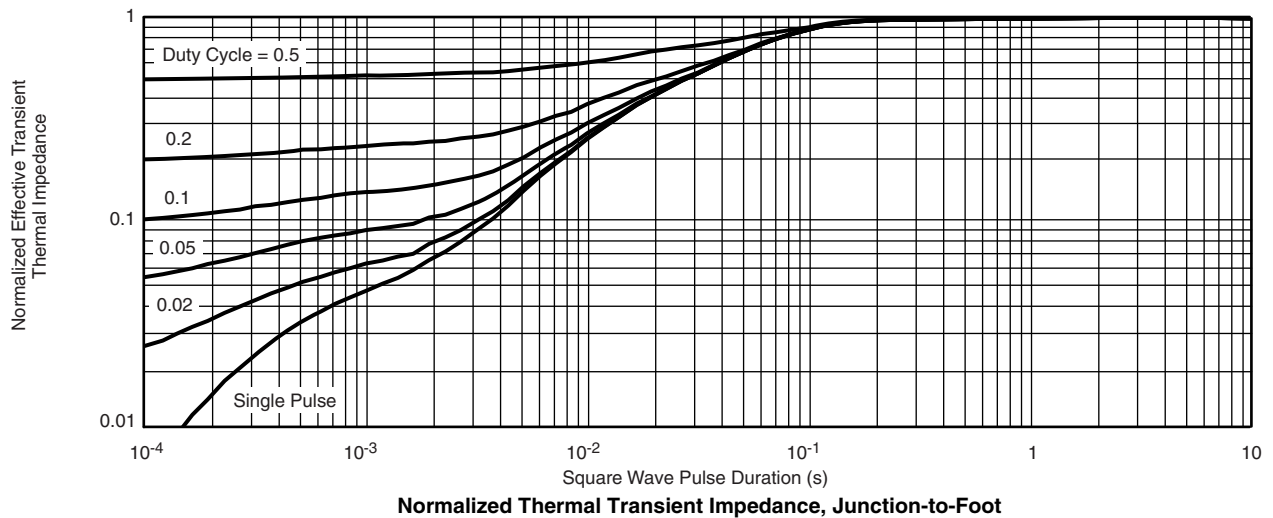
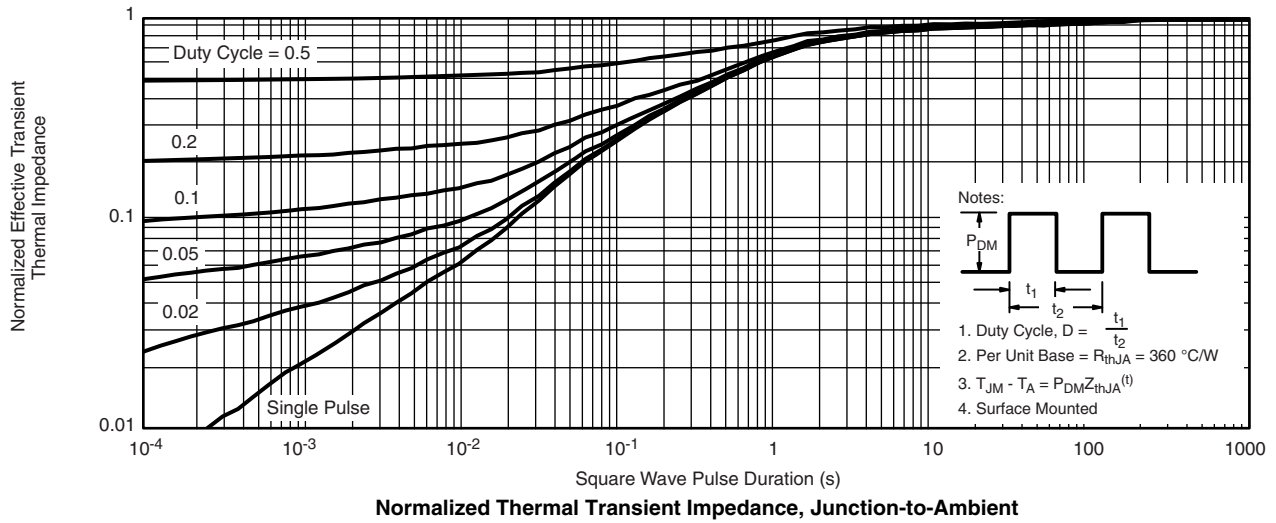
Gate Charge



On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Forward Diode Voltage vs. Temperature** **$R_{DS(on)}$ vs. V_{GS} vs. Temperature****Threshold Voltage****Single Pulse Power, Junction-to-Ambient*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area**

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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