N-Channel 20 V (D-S) MOSFET

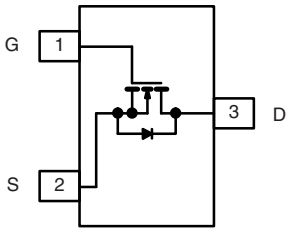
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ.)
20	0.85 at V_{GS} = 4.5 V	0.4	0.335
	1.08 at V_{GS} = 2.5 V	0.35	

FEATURES

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

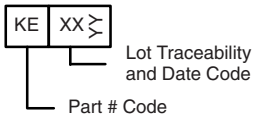
Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

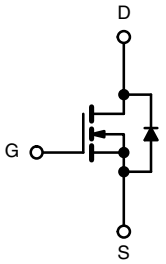
SC-70 (3-LEADS)



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	I_D	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	I_S	0.18	
	T_A = 25 °C		0.14[b, c]	
Maximum Power Dissipation	T_C = 25 °C	P_D	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]	t ≤ 5 s	R_{thJA}	540	670	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	450	570	

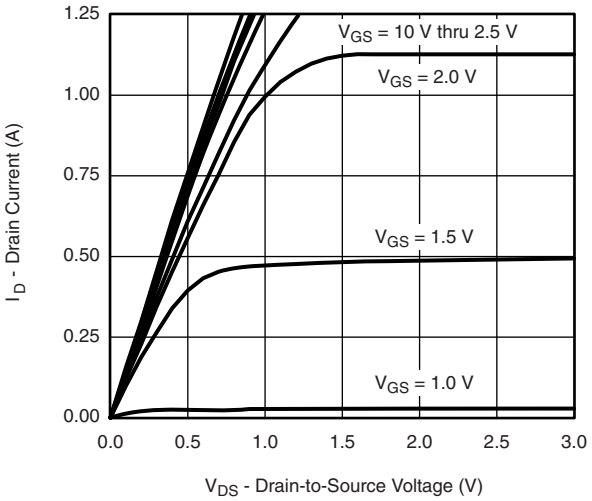
Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. Maximum under steady state conditions is 360 °C/W.

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	$\Delta V_{DS}/T_J$	I_D = 250 µA		20		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 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]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 4.5 V	0.4			A
		$V_{DS} \geq$ 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 $I_D \cong$ 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

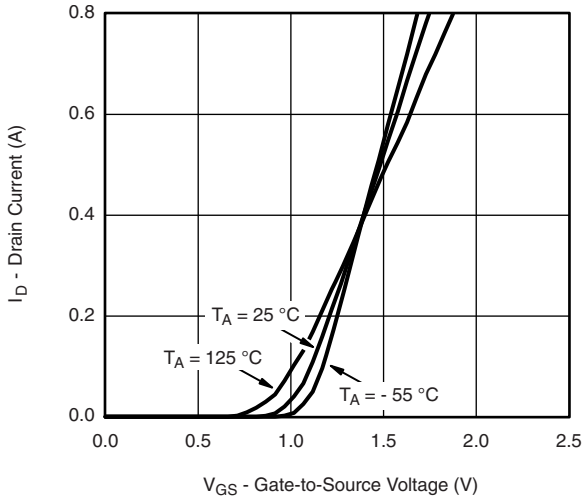
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

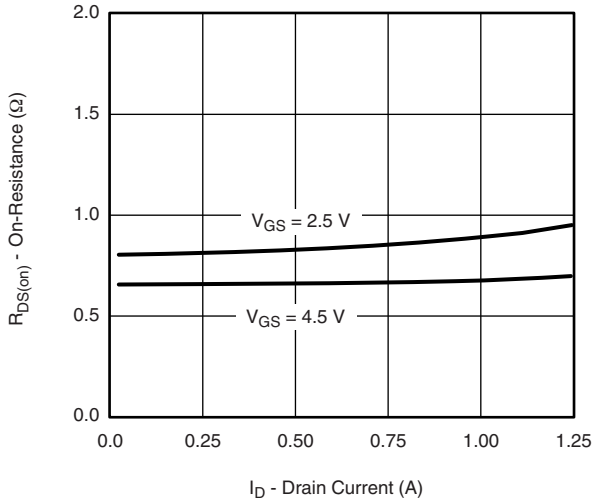
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



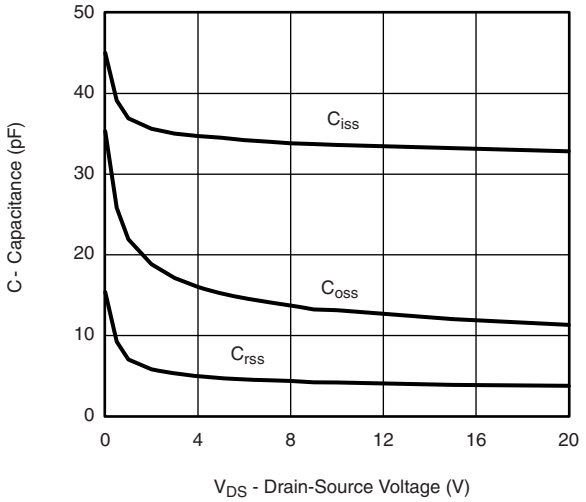
Output Characteristics



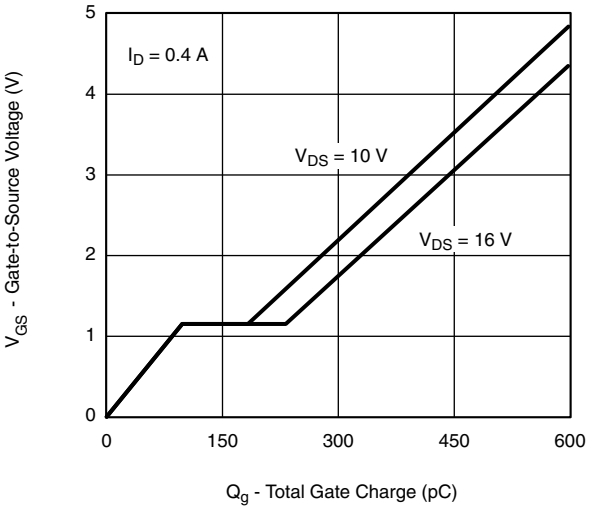
Transfer Characteristics Curves vs. Temperature



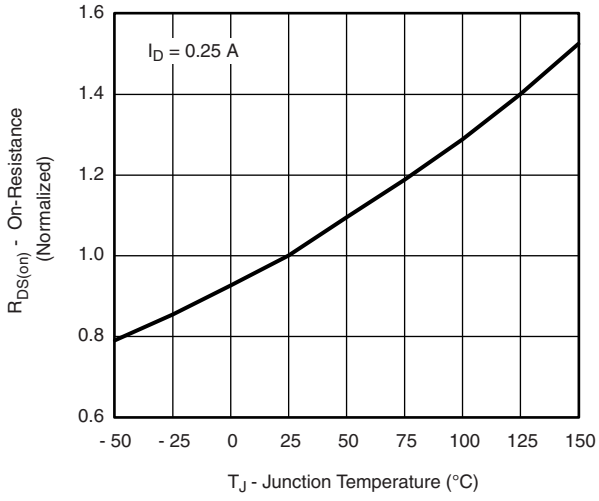
On-Resistance vs. Drain Current



Capacitance

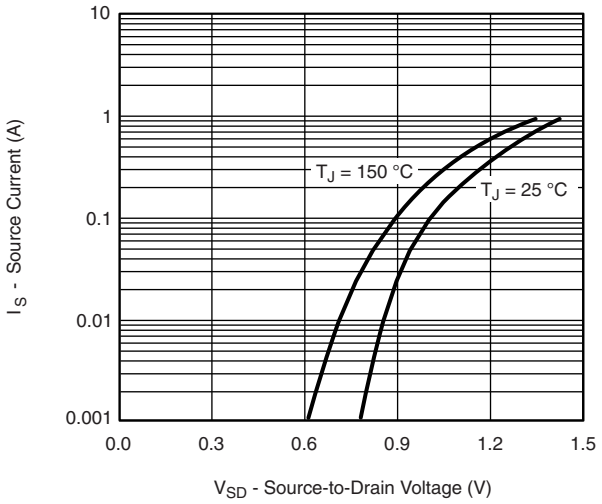


Gate Charge

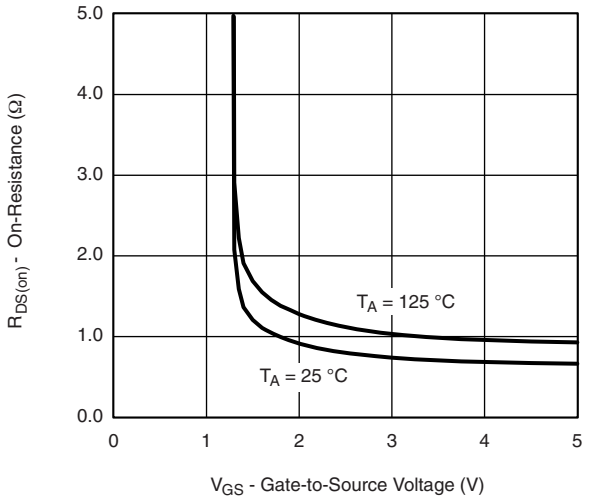


On-Resistance vs. Junction Temperature

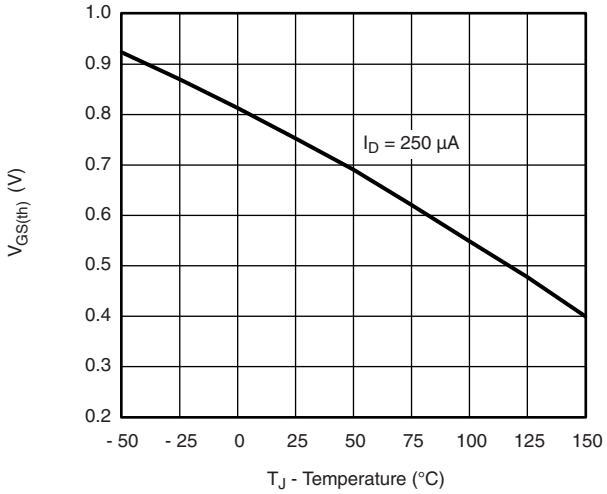
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



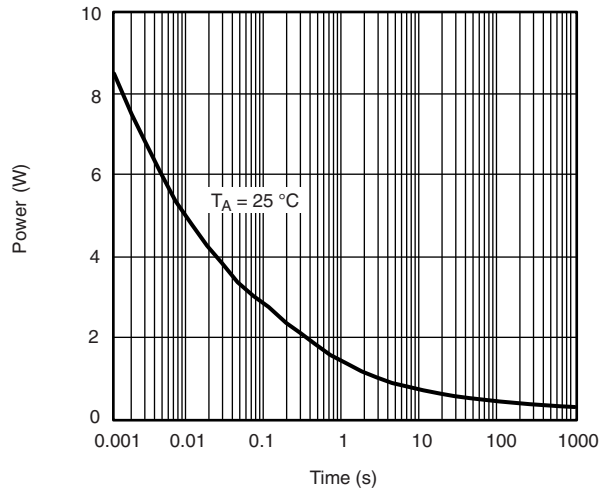
Forward Diode Voltage vs. Temperature



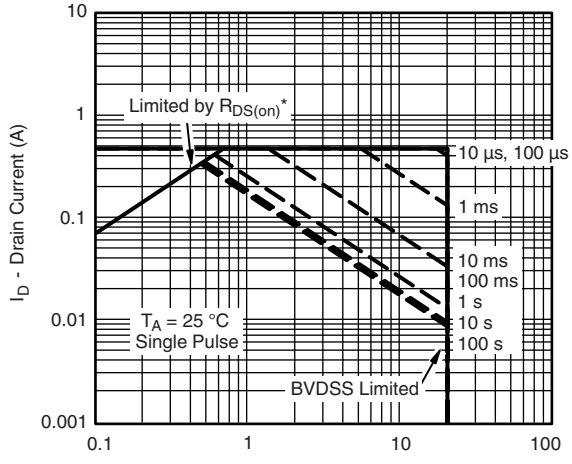
$R_{DS(on)}$ vs. V_{GS} vs. Temperature



Threshold Voltage



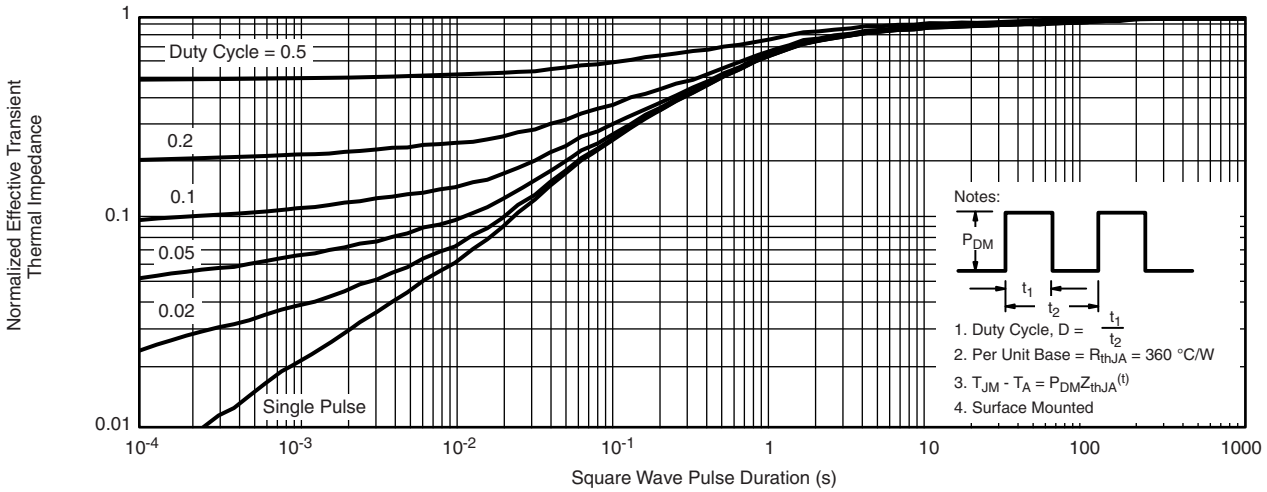
Single Pulse Power, Junction-to-Ambient



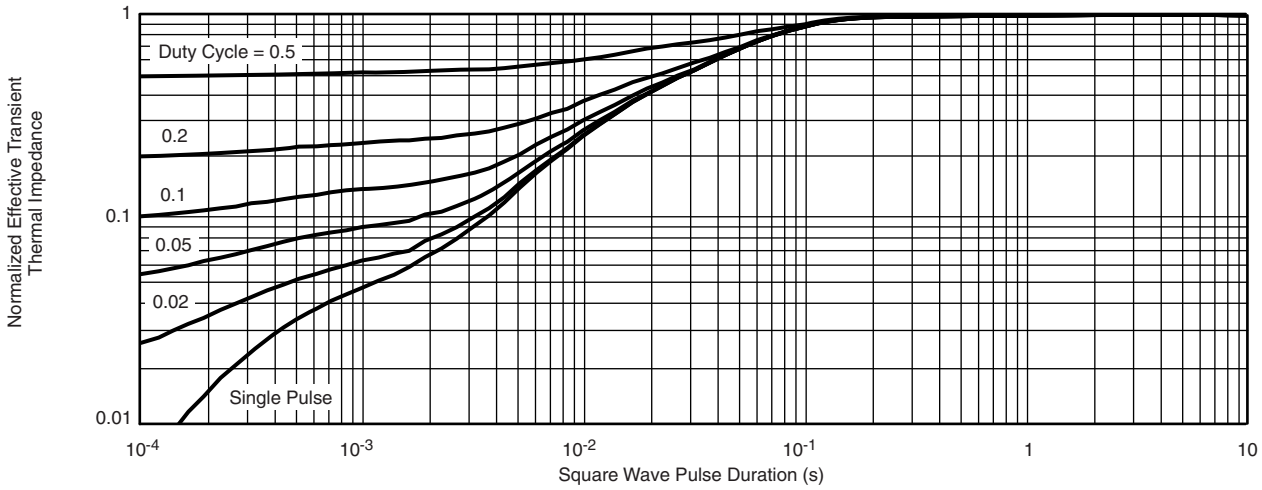
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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