

SM1F12NSUB-VB Datasheet

N-Channel 200-V (D-S) MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
200	0.038 at $V_{GS} = 15$ V	40	57
	0.043 at $V_{GS} = 10$ V	35	

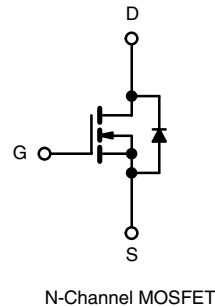
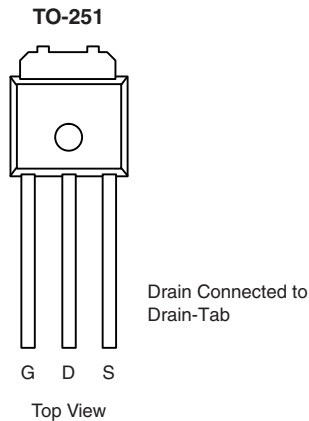
FEATURES

- Trench Power MOSFETS
- 175 °C Junction Temperature
- 100 % R_g and UIS Tested


RoHS
 COMPLIANT

APPLICATIONS

- Power Supply
- Lighting Systems



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	± 25	
Continuous Drain Current ($T_J = 175$ °C)	I_D	40	A
		26	
Pulsed Drain Current	I_{DM}	150	
Single Pulse Avalanche Current	I_{AS}	20	
Single Pulse Avalanche Energy ^a	E_{AS}	20	mJ
Maximum Power Dissipation ^a	P_D	146 ^b	W
		3.12	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.75	

Notes:

 a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

c. When Mounted on 1" square PCB (FR-4 material).

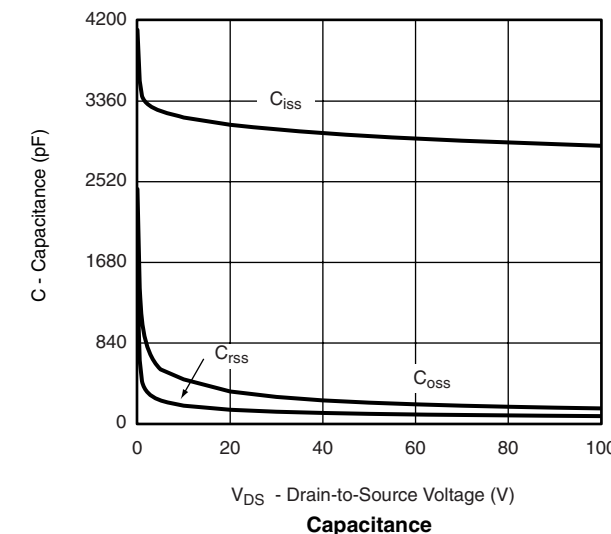
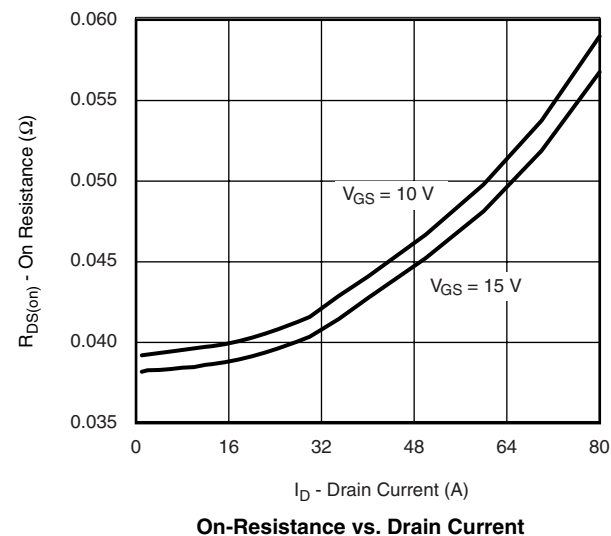
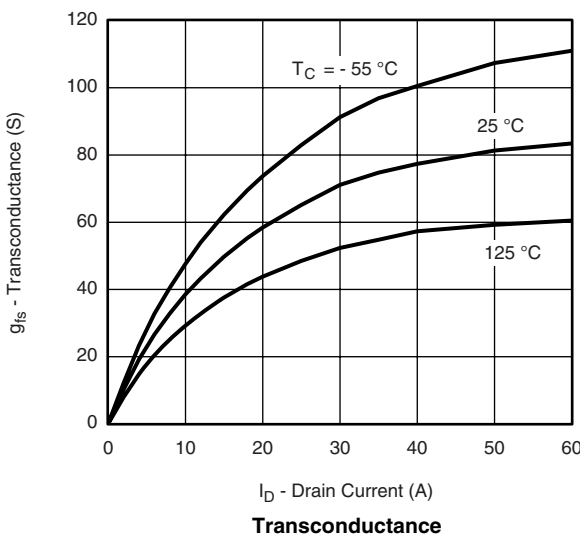
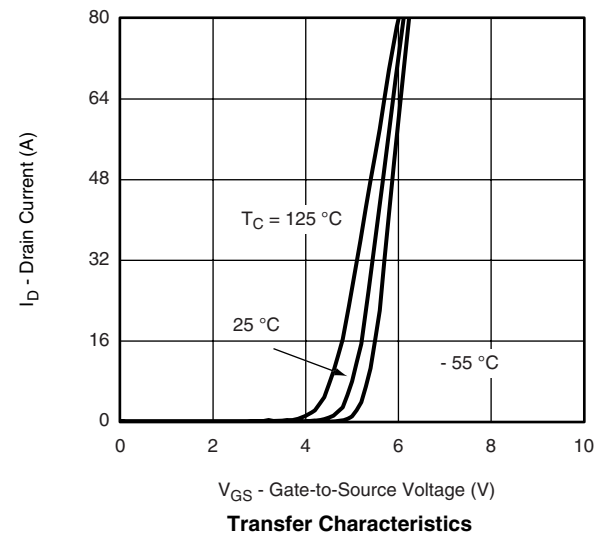
SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	200			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2.5		4.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
		V _{DS} = 0 V, V _{GS} = ± 25 V			± 300	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 200 V, V _{GS} = 0 V			1	μA
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 100 °C			25	
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 150 °C			250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	40			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.038		Ω
		V _{GS} = 15 V, I _D = 20 A		0.043		
		V _{GS} = 10 V, I _D = 20 A, T _J = 100 °C		0.088		
		V _{GS} = 10 V, I _D = 20 A, T _J = 150 °C		0.120		
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A	25			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		3100		pF
Output Capacitance	C _{oss}			300		
Reverse Transfer Capacitance	C _{rss}			135		
Total Gate Charge ^c	Q _g	V _{DS} = 100 V, V _{GS} = 15 V, I _D = 50 A		85	127	nC
		V _{DS} = 100 V, V _{GS} = 10 V, I _D = 50 A		57	85	
Gate-Source Charge ^c	Q _{gs}			14		
Gate-Drain Charge ^c	Q _{gd}			20		
Gate Resistance	R _g	f = 1 MHz		1.2	1.8	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 100 V, R _L = 2 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 1 Ω		16	25	ns
Rise Time ^c	t _r			170	260	
Turn-Off Delay Time ^c	t _{d(off)}			27	42	
Fall Time ^c	t _f			9	18	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C						
Continuous Current	I _S				36	A
Pulsed Current	I _{SM}				80	
Forward Voltage ^a	V _{SD}	I _F = 20 A, V _{GS} = 0 V		0.86	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 40 A, di/dt = 100 A/μs		116	175	ns
Peak Reverse Recovery Current	I _{RM(REC)}			9	14	A
Reverse Recovery Charge	Q _{rr}			0.53	0.8	μC
Reverse Recovery Fall Time	t _a			84		nS
Reverse Recovery Rise Time	t _b			32		

Notes:

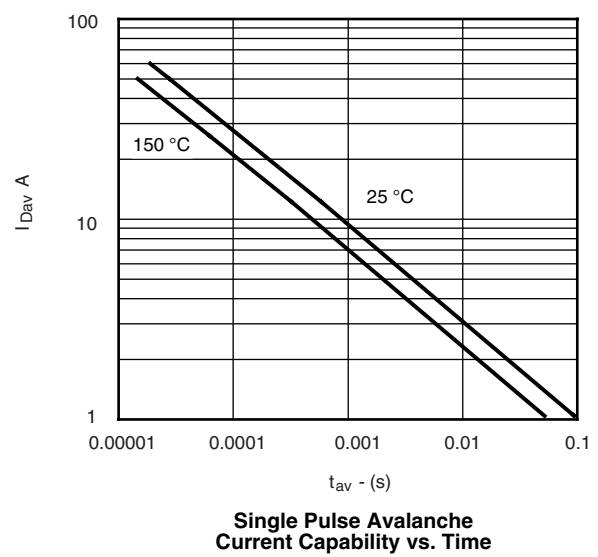
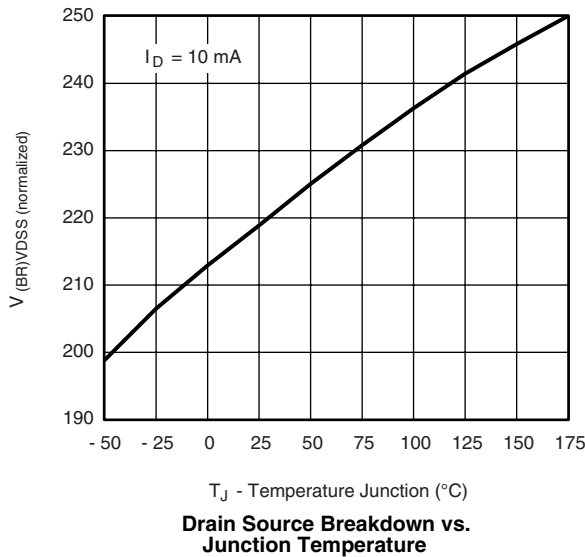
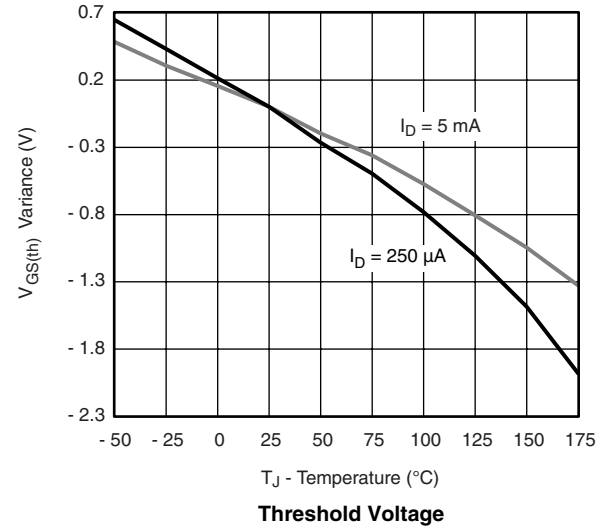
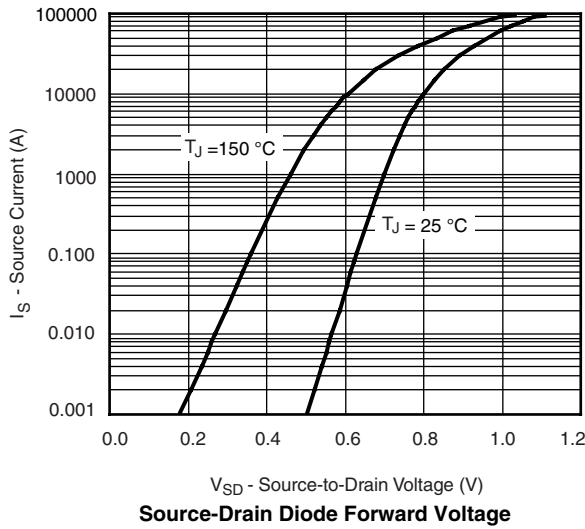
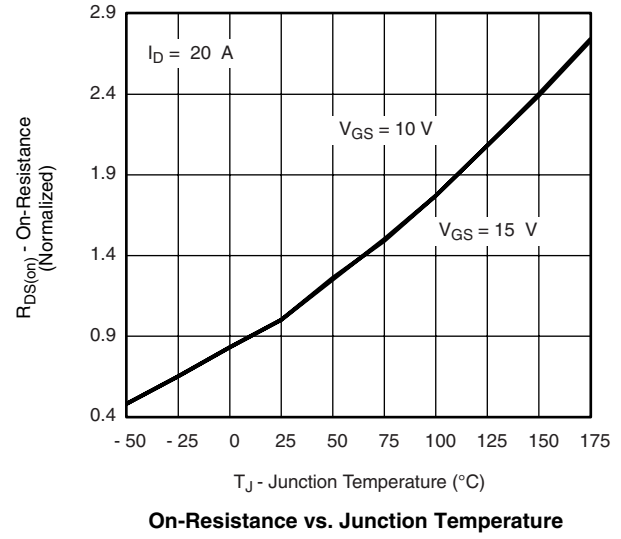
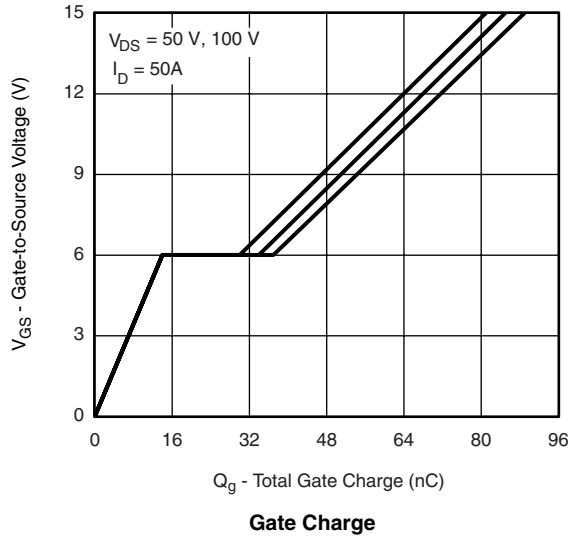
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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.

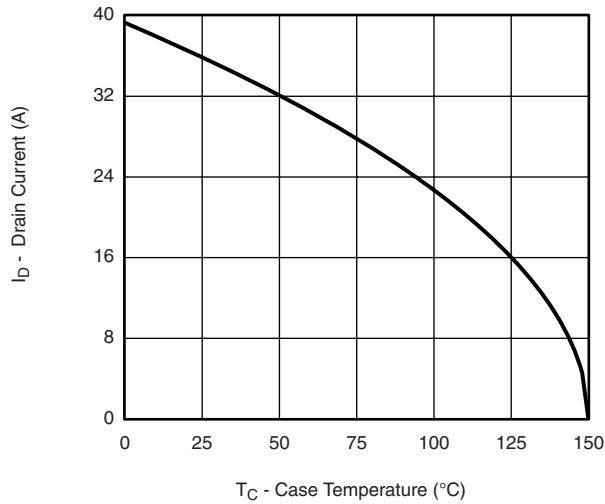
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



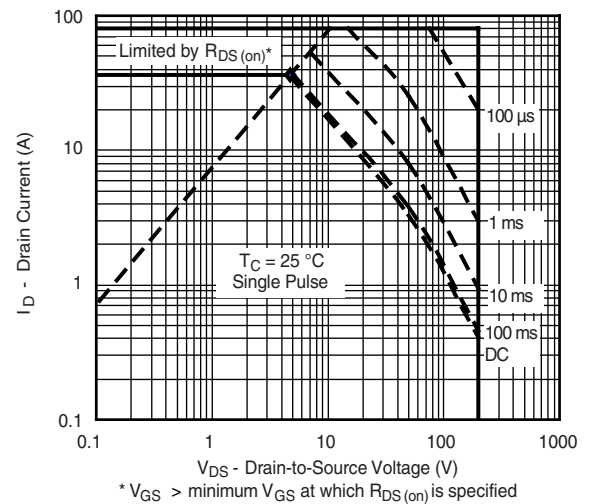
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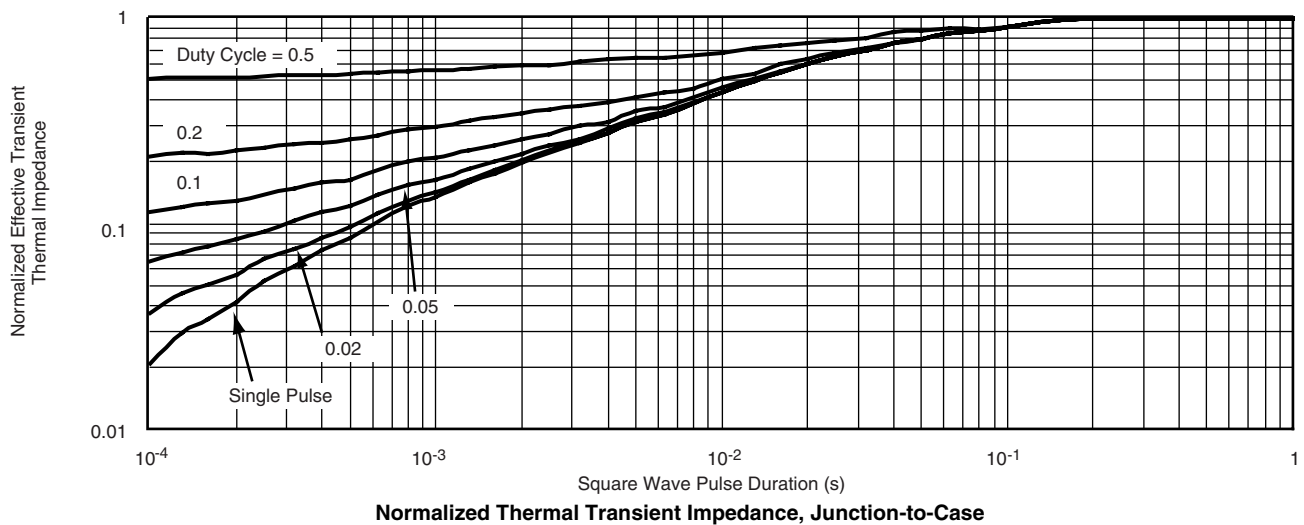
THERMAL RATINGS



Maximum Drain Current vs. Case Temperature

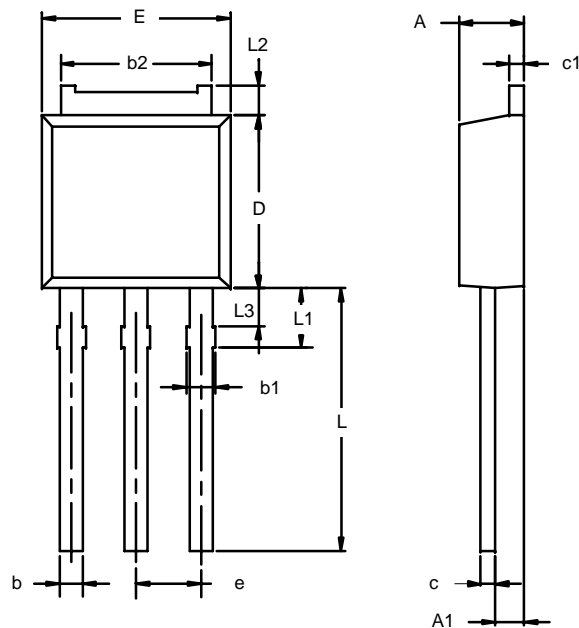


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-251AA



Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
b	0.71	0.89	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.43	0.206	0.214
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
E	6.48	6.73	0.255	0.265
e	2.28 BSC		0.090 BSC	
L	3.89	9.53	0.153	0.375
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060
ECN: S-03946—Rev. E, 09-Jul-01 DWG: 5346				

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