

N-Channel 40-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.0023 at $V_{GS} = 10$ V	110 ^a
	0.003 at $V_{GS} = 4.5$ V	

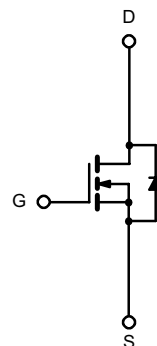
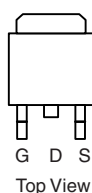
FEATURES

- TrenchFET® Power MOSFET
- 100 % R_g Tested



RoHS
COMPLIANT

TO-263



Ordering Information: SUM110N04-2m3L-E3 (Lead (Pb)-free)

N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	$T_C = 25$ °C	I_D	110 ^a
	$T_C = 125$ °C	I_D	110 ^a
Pulsed Drain Current	I_{DM}	440	A
Avalanche Current, Single Pulse	I_{AS}	75	
Repetitive Avalanche Energy, Single Pulse	$L = 0.1$ mH	E_{AS}	280
Maximum Power Dissipation	$T_C = 25$ °C	P_D	375 ^b
	$T_A = 25$ °C		3.75
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Unit
Junction-to-Ambient	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.4	

Notes:

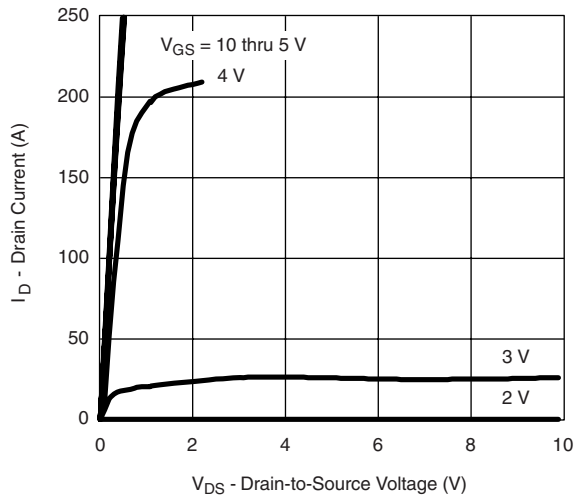
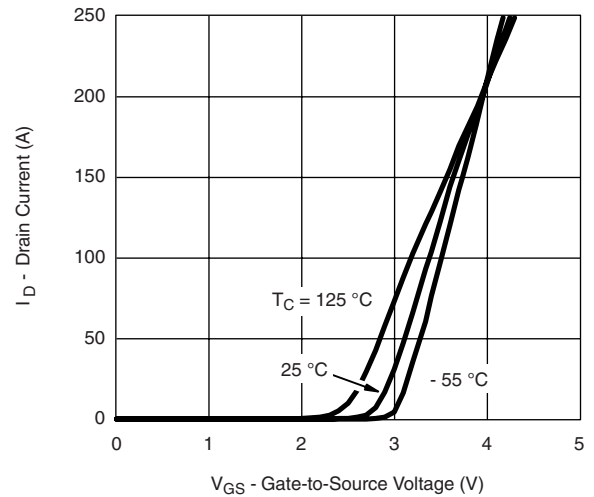
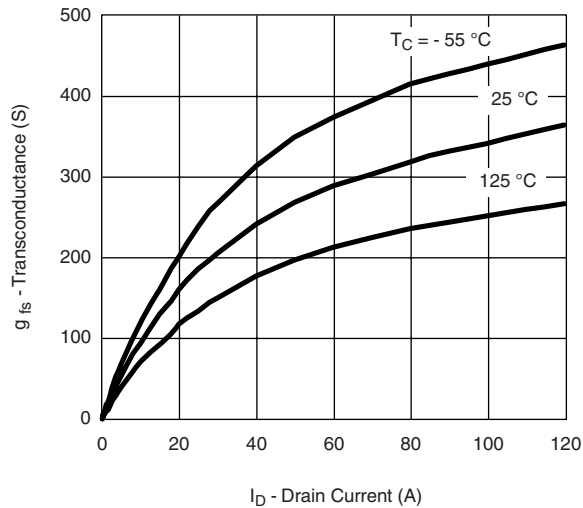
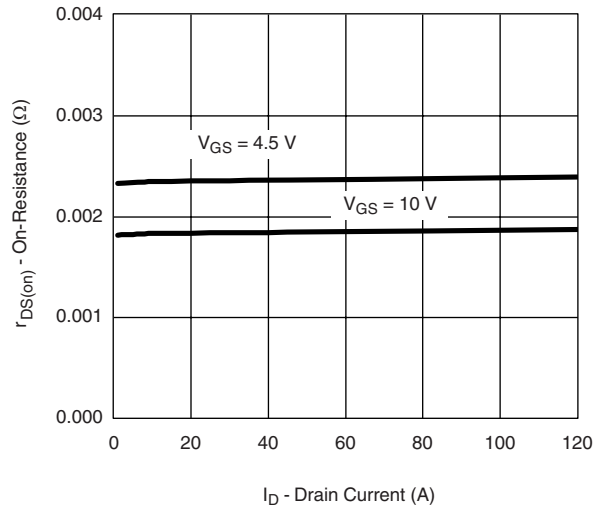
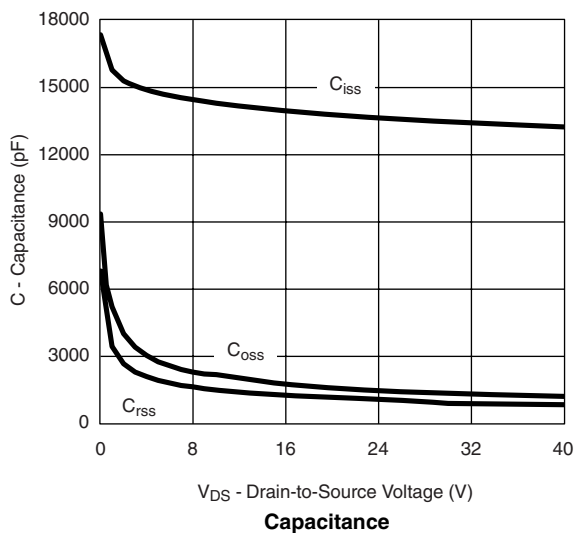
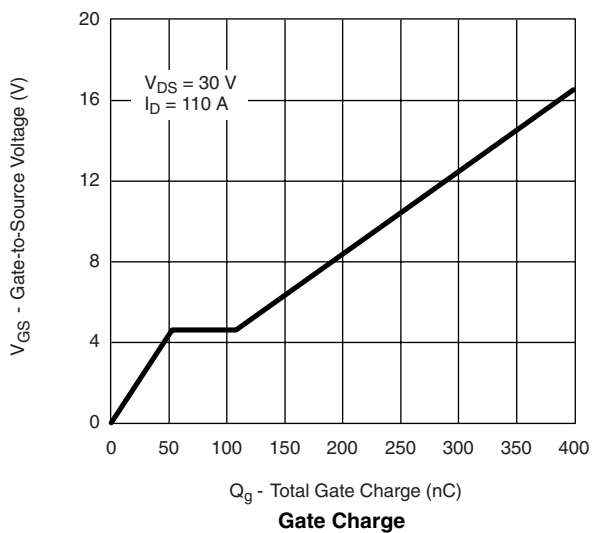
- Package limited.
- See SOA curve for voltage derating.
- When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1		3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 40\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$			50	
		$V_{DS} = 40\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 175\text{ }^{\circ}\text{C}$			10	mA
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	120			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$		0.0019	0.0023	Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 20\text{ A}$		0.0024	0.003	
		$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$			0.0035	
		$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$, $T_J = 175\text{ }^{\circ}\text{C}$			0.0044	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 30\text{ A}$	30			S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$		13600		pF
Output Capacitance	C_{oss}			1420		
Reverse Transfer Capacitance	C_{rss}			1040		
Total Gate Charge ^c	Q_g	$V_{DS} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 110\text{ A}$		240	360	nC
Gate-Source Charge ^c	Q_{gs}			53		
Gate-Drain Charge ^c	Q_{gd}			55		
Gate Resistance	R_g	$f = 1.0\text{ MHz}$	0.65	1.3	2	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 0.27\text{ }\Omega$ $I_D \cong 110\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 2.5\text{ }\Omega$		25	40	ns
Rise Time ^c	t_r			100	150	
Turn-Off Delay Time ^c	$t_{d(off)}$			125	190	
Fall Time ^c	t_f			200	300	
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^{\circ}\text{C}$ ^b						
Continuous Current	I_S				110	A
Pulsed Current	I_{SM}				240	
Forward Voltage ^a	V_{SD}	$I_F = 85\text{ A}$, $V_{GS} = 0\text{ V}$		1.1	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 85\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		56	85	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$			3.1	4.7	A
Reverse Recovery Charge	Q_{rr}			0.087	0.2	μC

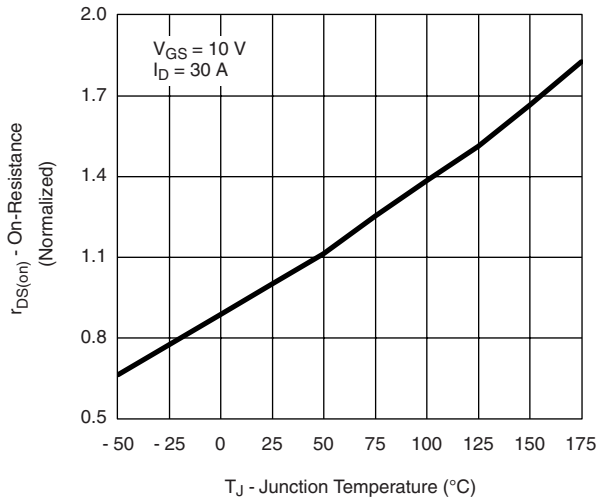
Notes:

- 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.

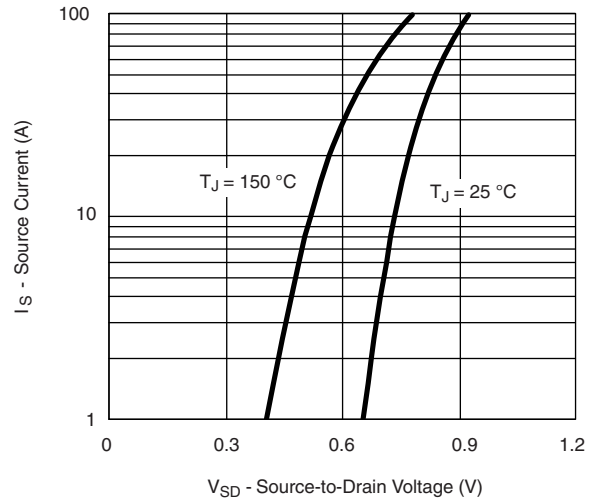
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****Transconductance****On-Resistance vs. Drain Current****Capacitance****Gate Charge**

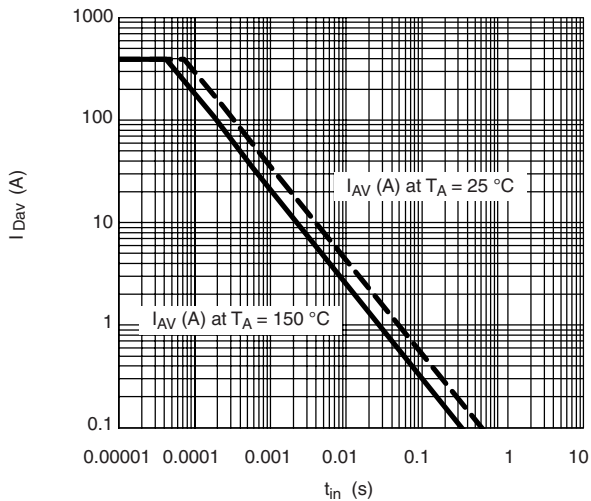
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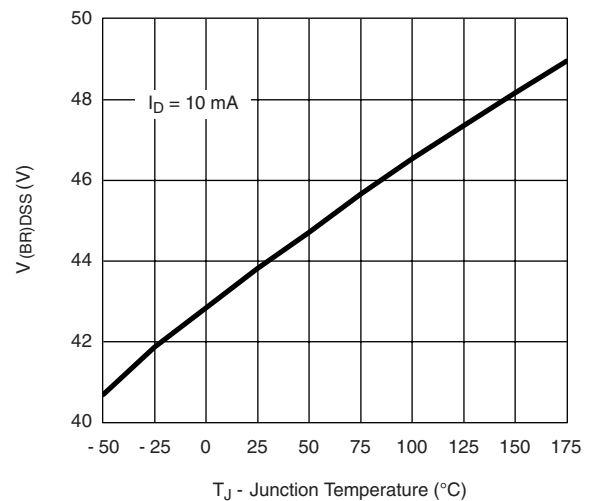
On-Resistance vs. Junction Temperature



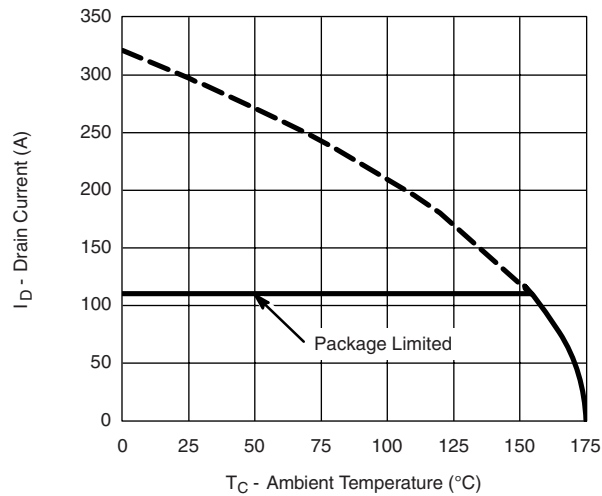
Source-Drain Diode Forward Voltage



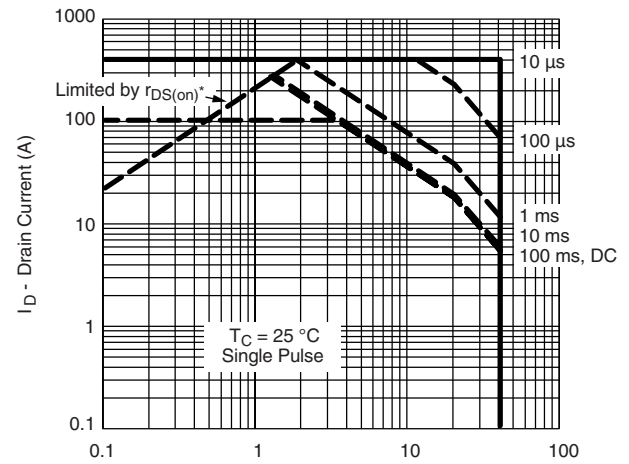
Avalanche Current vs. Time



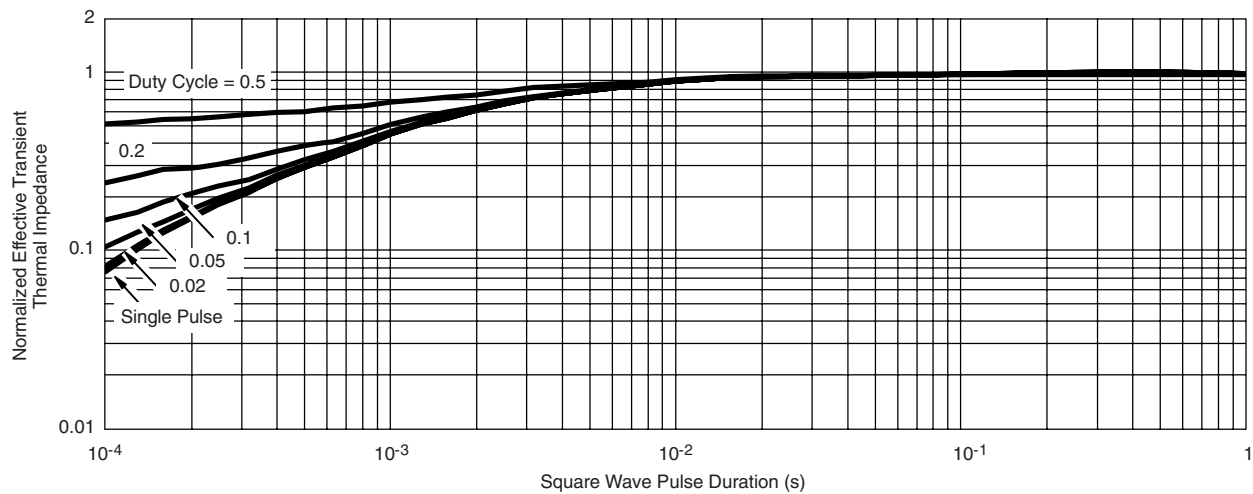
Drain Source Breakdown vs. Junction Temperature

**THERMAL RATINGS**

**Maximum Drain Current
vs. Case Temperature**



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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