



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	

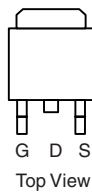
FEATURES

- TrenchFET[®] Power MOSFET
- 100 % R_g Tested

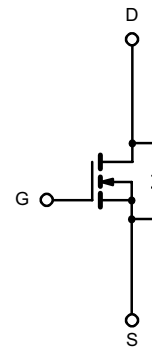


RoHS COMPLIANT

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	A
	$T_C = 125$ °C		110 ^a	
Pulsed Drain Current		I_{DM}	440	
Avalanche Current, Single Pulse		I_{AS}	75	
Repetitive Avalanche Energy, Single Pulse	$L = 0.1$ mH	E_{AS}	280	mJ
Maximum Power Dissipation	$T_C = 25$ °C	P_D	375 ^b	W
	$T_A = 25$ °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	PCB Mount ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)		R_{thJC}	0.4	

Notes:

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

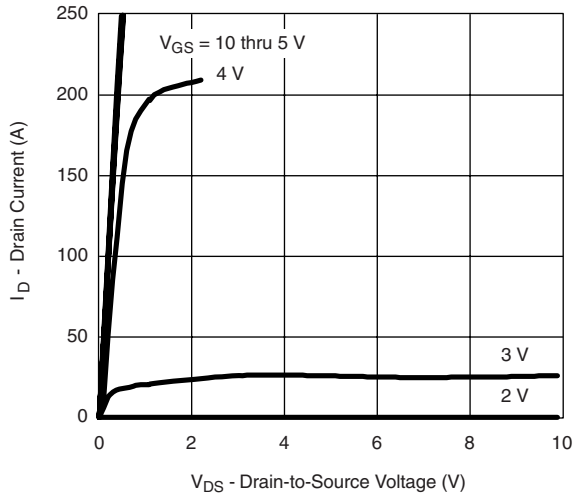
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	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		μF
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:

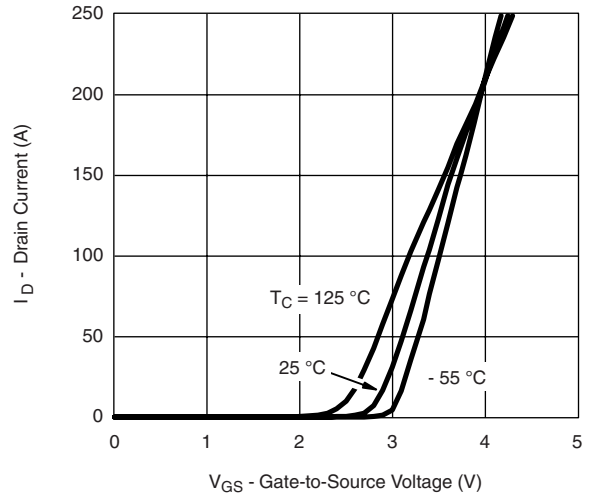
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

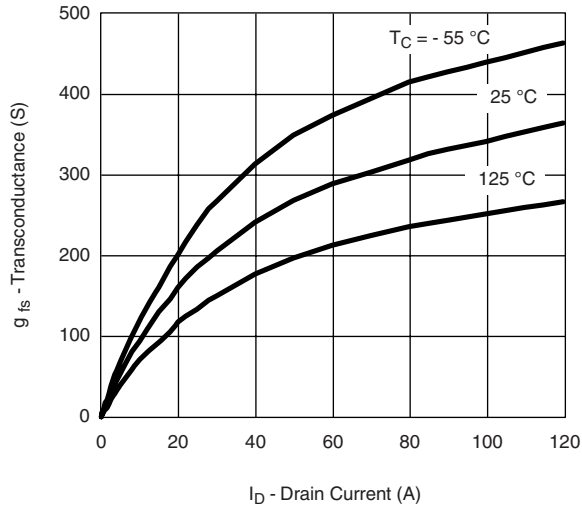
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



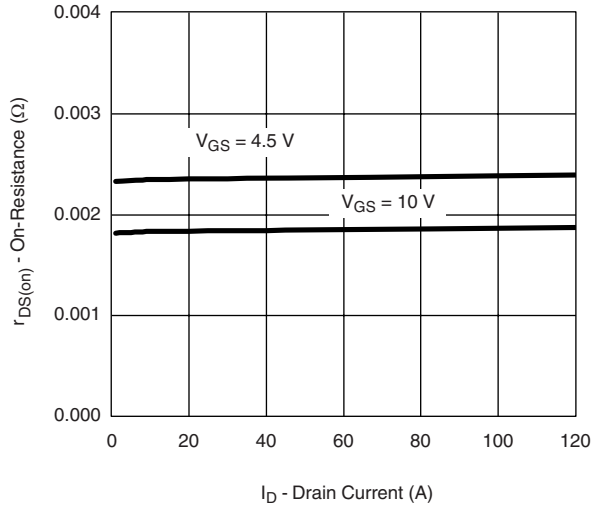
Output Characteristics



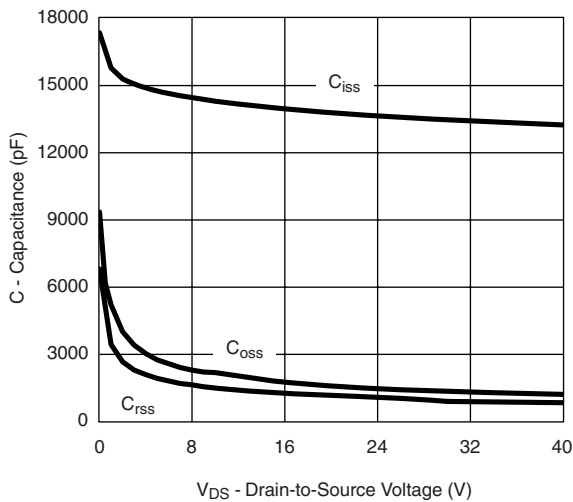
Transfer Characteristics



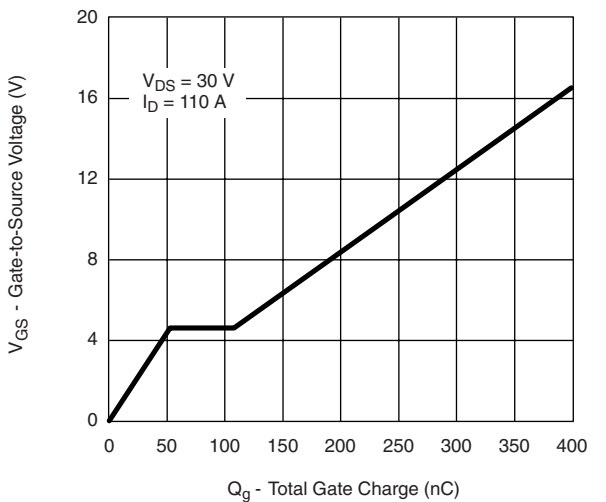
Transconductance



On-Resistance vs. Drain Current

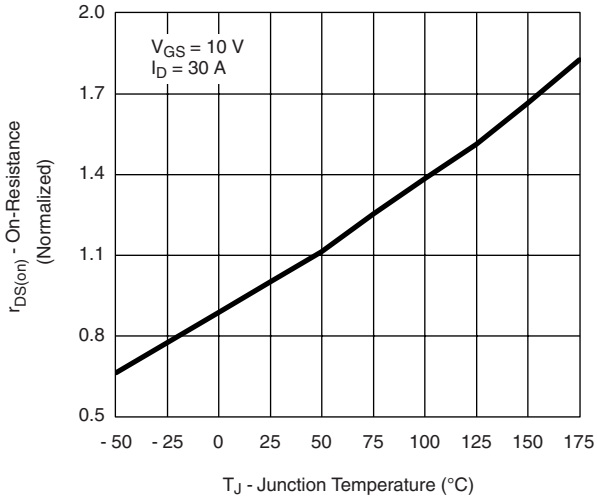


Capacitance

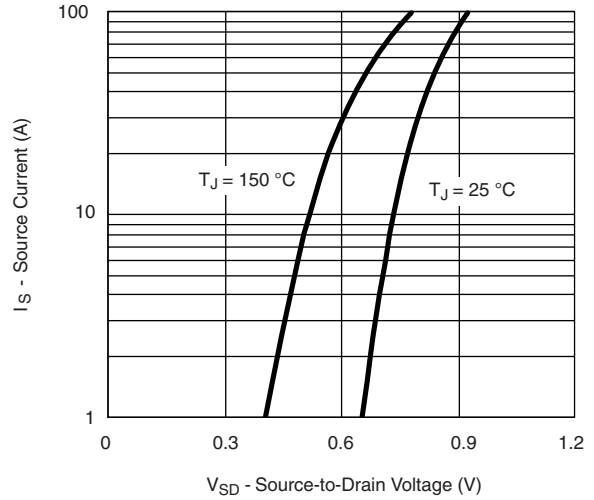


Gate Charge

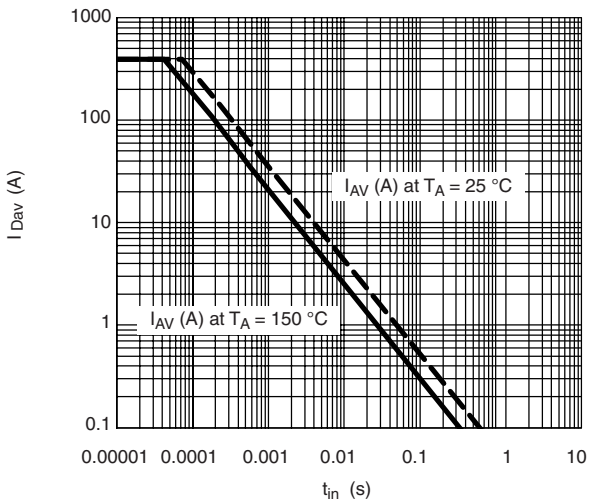
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



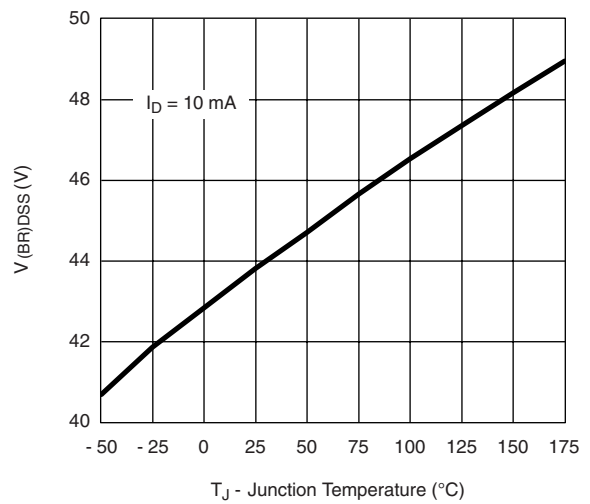
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



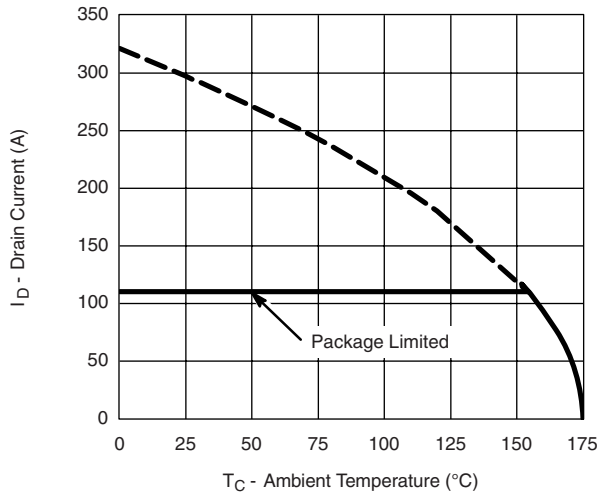
Avalanche Current vs. Time



Drain Source Breakdown vs. Junction Temperature

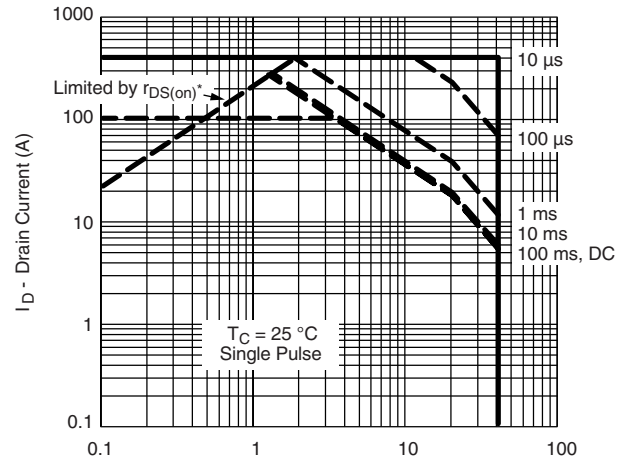


THERMAL RATINGS



T_C - Ambient Temperature ($^{\circ}C$)

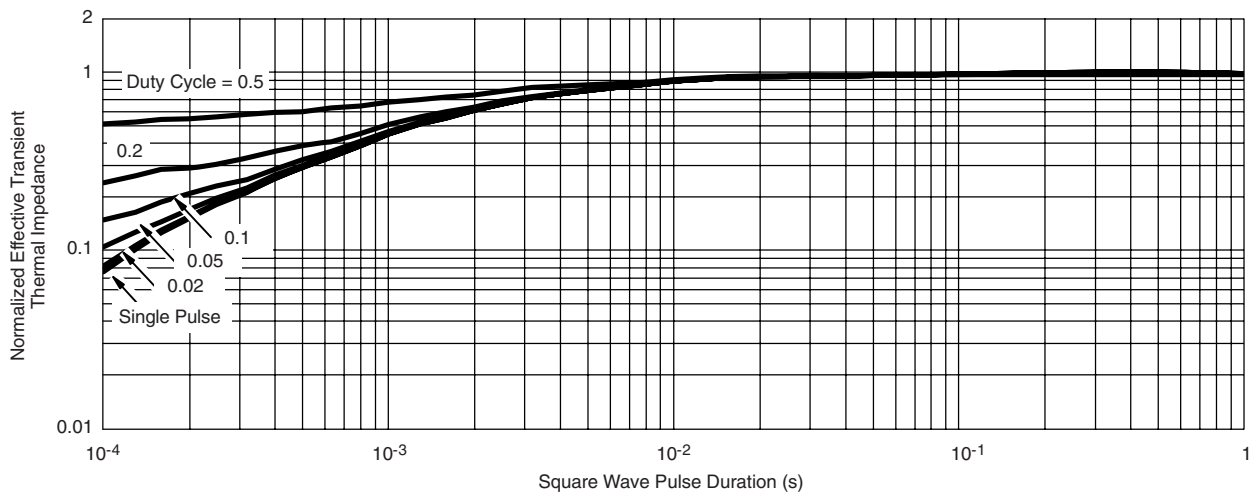
Maximum Drain Current vs. Case Temperature



V_{DS} - Drain-to-Source Voltage (V)

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

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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