

N-Channel 40-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.0035 at $V_{GS} = 10$ V	110 ^a

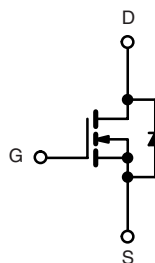
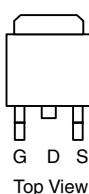
FEATURES

- TrenchFET[®] Power MOSFET
- 175 °C Junction Temperature



Available
RoHS*
COMPLIANT

TO-263



N-Channel MOSFET

Ordering Information: SUM110N04-04
SUM110N04-04-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °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)	I_D	110 ^a	A
		107 ^a	
Pulsed Drain Current	I_{DM}	350	
Avalanche Current	I_{AR}	60	
Repetitive Avalanche Energy ^b	E_{AR}	180	mJ
Maximum Power Dissipation ^b	P_D	250 ^c	W
		3.75	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient	R_{thJA}	40	°C/W
Junction-to-Case	R_{thJC}	0.6	

Notes:

- Package limited.
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).

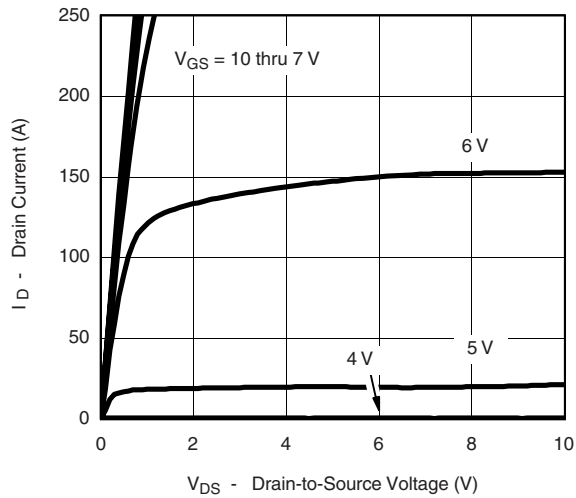
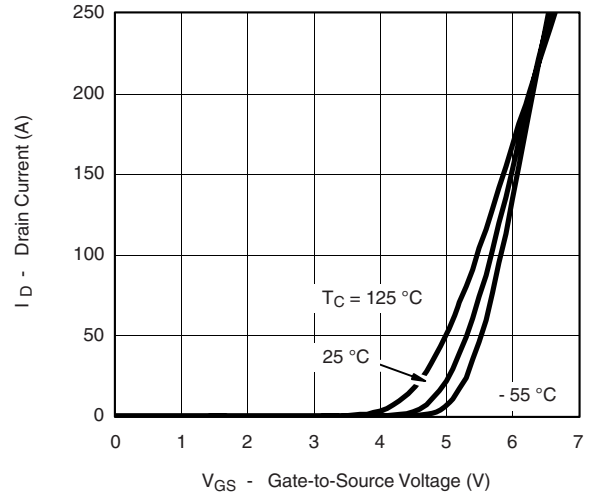
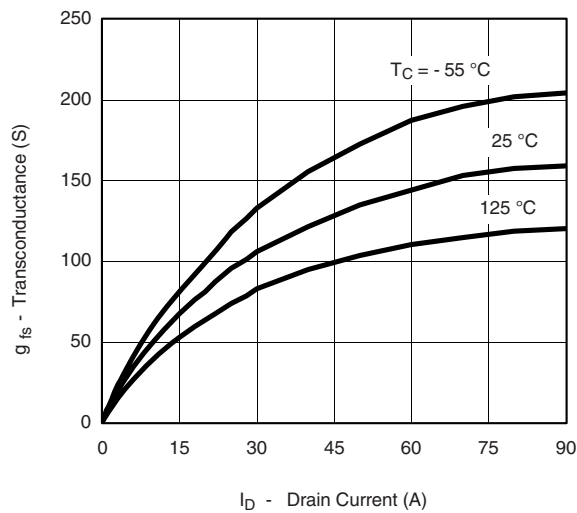
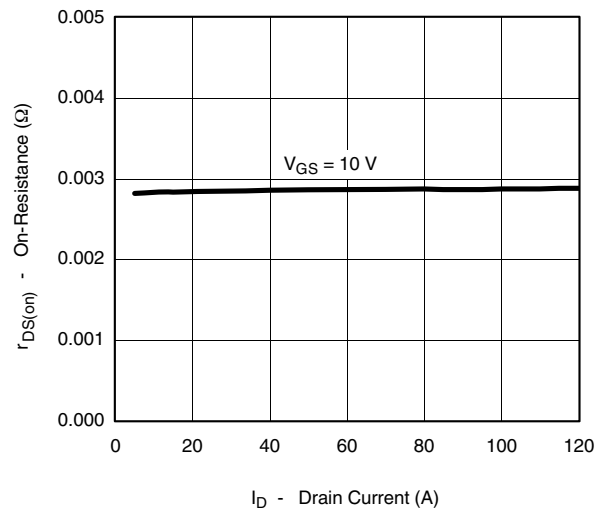
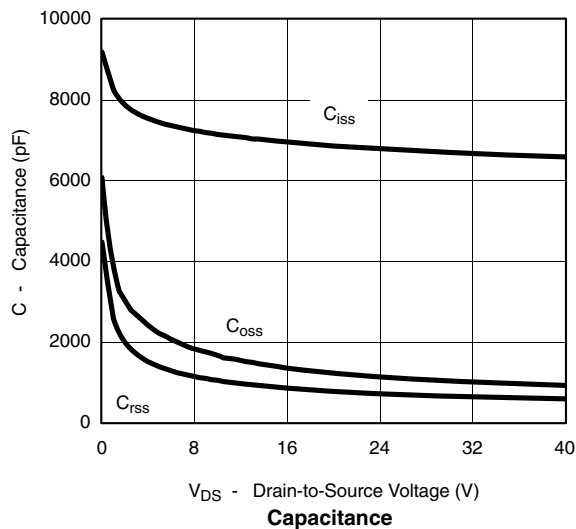
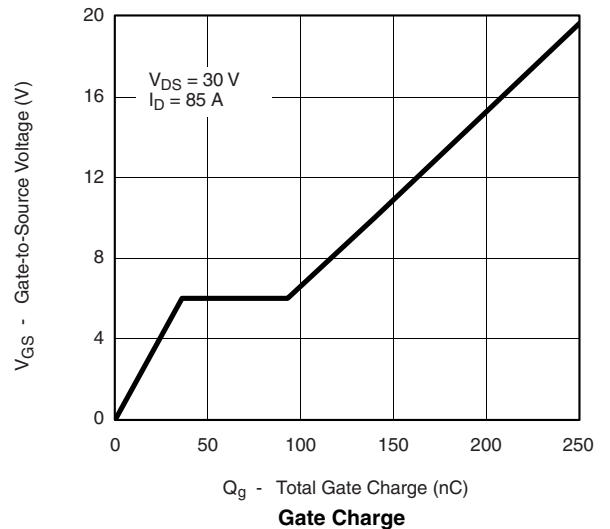
* Pb containing terminations are not RoHS compliant, exemptions may apply.

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 _{DS} = 0 V, I _D = 250 μA	40			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2		4	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = 20 V			100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V			1	μA
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 175 °C			250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	120			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 30 A		0.0028	0.0035	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C			0.0055	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C			0.006	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	30			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		6800		pF
Output Capacitance	C _{oss}			1110		
Reverse Transfer Capacitance	C _{rss}			690		
Total Gate Charge ^c	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 110 A		140	200	nC
Gate-Source Charge ^c	Q _{gs}			35		
Gate-Drain Charge ^c	Q _{gd}			55		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.47 Ω I _D ≅ 110 A, V _{GEN} = 10 V, R _g = 2.5 Ω		20	35	ns
Rise Time ^c	t _r			115	175	
Turn-Off Delay Time ^c	t _{d(off)}			75	115	
Fall Time ^c	t _f			85	130	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				110	A
Pulsed Current	I _{SM}				350	
Forward Voltage ^a	V _{SD}	I _F = 110 A, V _{GS} = 0 V		1.1	1.4	V
Reverse Recovery Time	t _{rr}	I _F = 110 A, di/dt = 100 A/μs		50	80	ns
Peak Reverse Recovery Current	I _{RM(REC)}			2	3	A
Reverse Recovery Charge	Q _{rr}				0.05	0.12

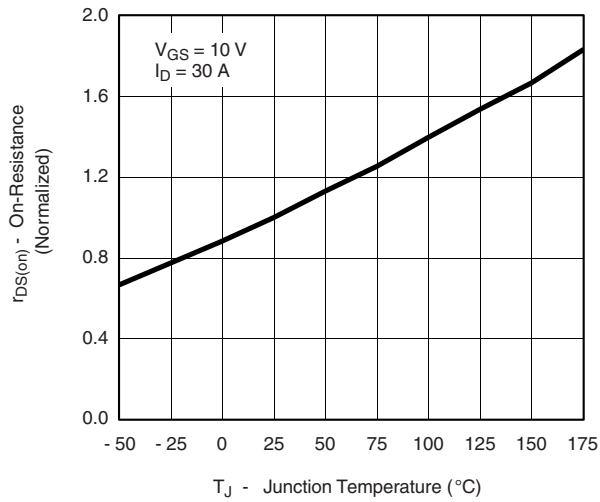
Notes:

- 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.

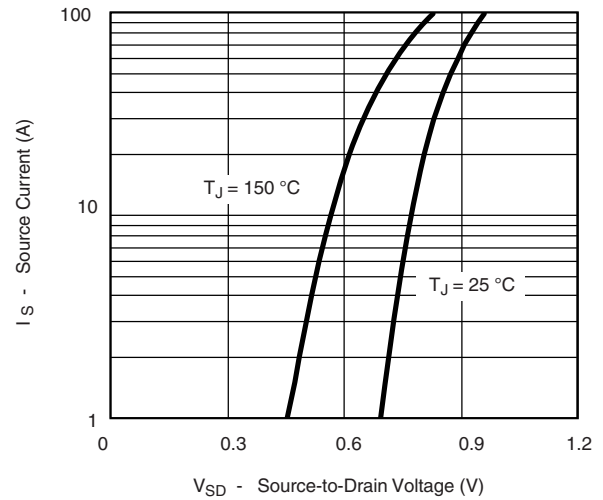
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

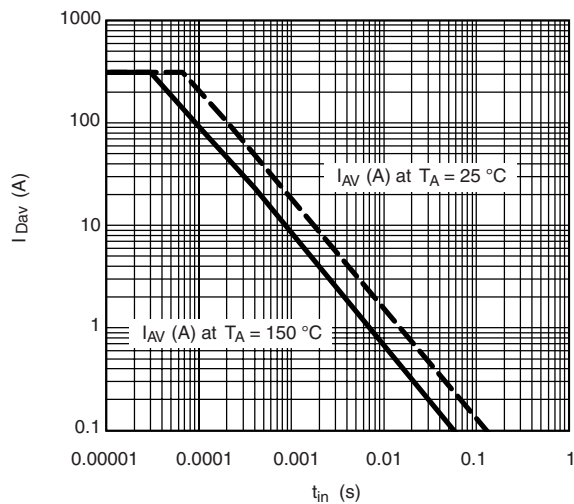
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



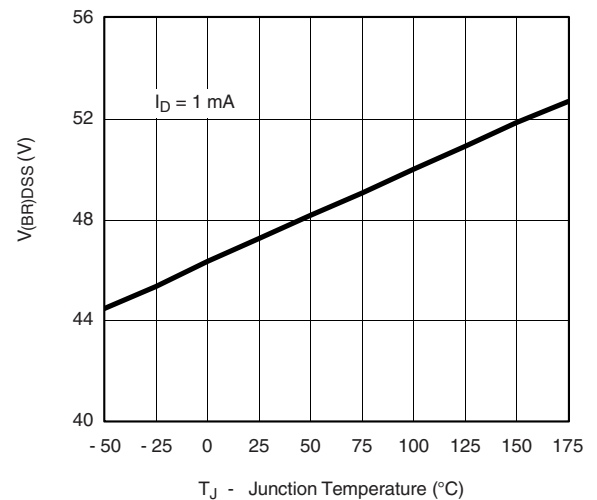
On-Resistance vs. Junction Temperature



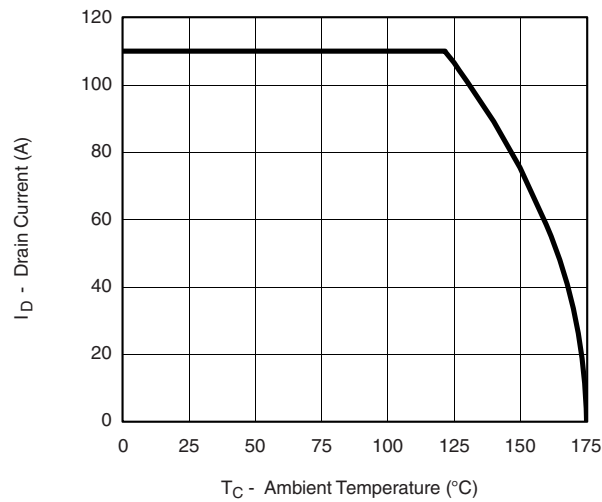
Source-Drain Diode Forward Voltage



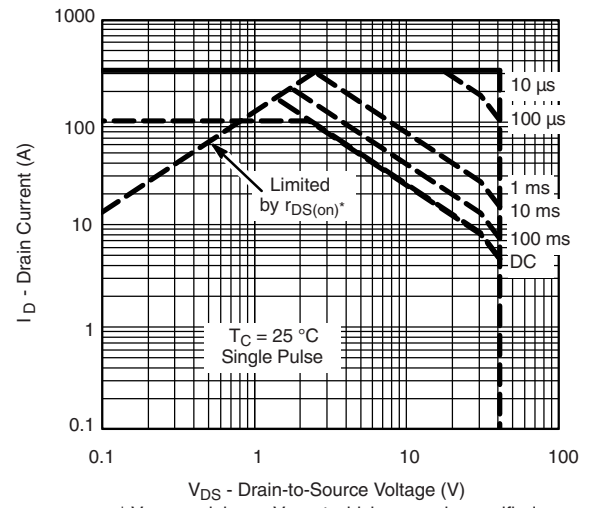
Avalanche Current vs. Time



Drain Source Breakdown vs. Junction Temperature

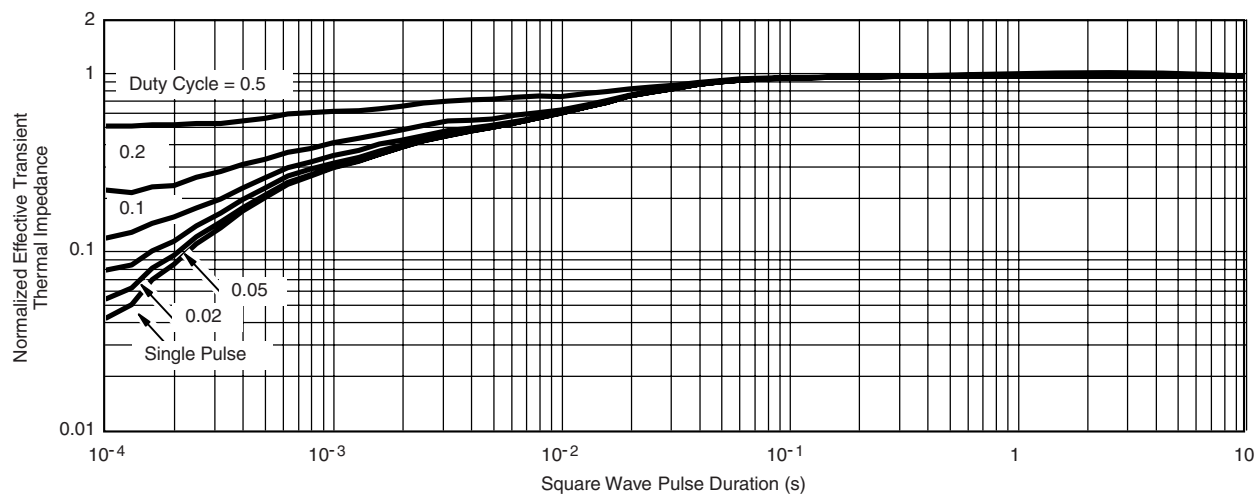
**THERMAL RATINGS**

**Maximum Avalanche and Drain Current
vs. Case Temperature**



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

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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