

N-Channel 40-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.0031 at $V_{GS} = 10$ V	110 ^a

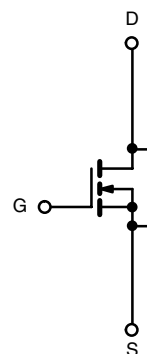
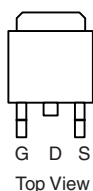
FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- Package with Low Thermal Resistance
- Extremely Low Q_{gd} WFET™ Technology for Low Switching Losses
- 100 % R_g Tested



Available
RoHS*
COMPLIANT

TO-263



Ordering Information: SUM110N04-03P-E3 (Lead (Pb)-free)

N-Channel MOSFET

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)	$T_C = 25$ °C	I_D	110 ^a
	$T_C = 125$ °C		110 ^a
Pulsed Drain Current	I_{DM}	440	A
Avalanche Current	I_{AS}	70	
Single Pulse Avalanche Energy ^b	E_{AS}	211	
Maximum Power Dissipation ^b	$T_C = 25$ °C	P_D	375 ^c
	$T_A = 25$ °C		3.75
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

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

Notes:

a. Package limited.

b. Duty cycle ≤ 1 %.

c. See SOA curve for voltage derating.

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

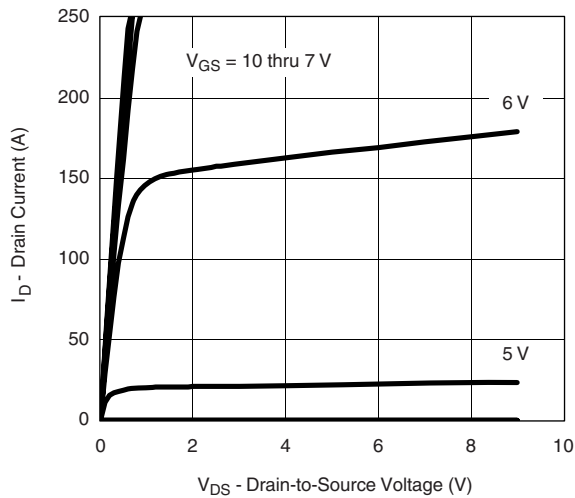
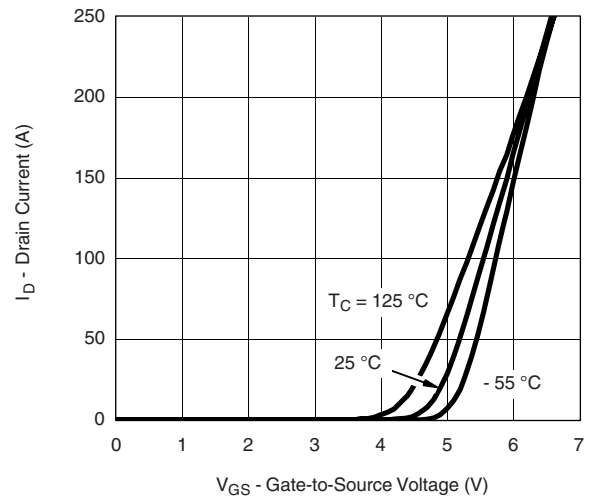
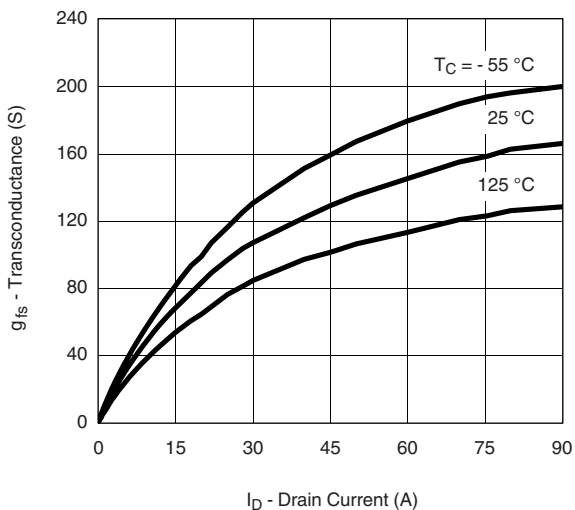
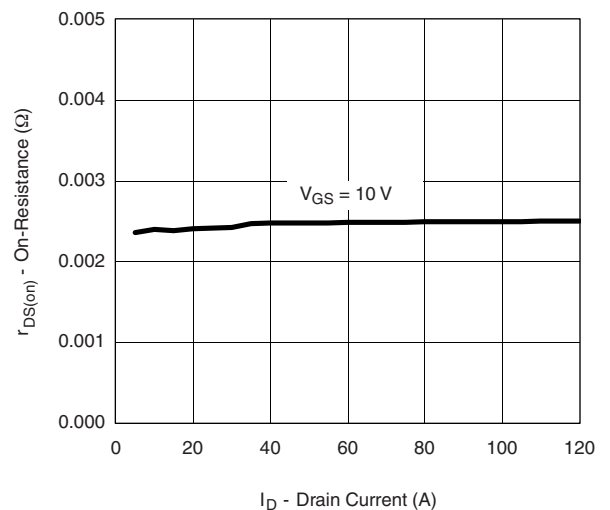
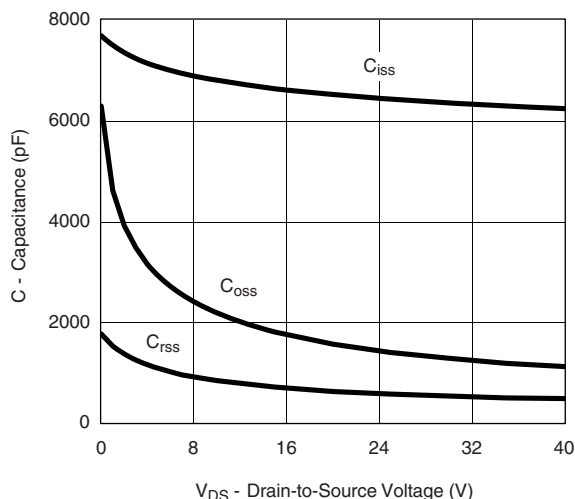
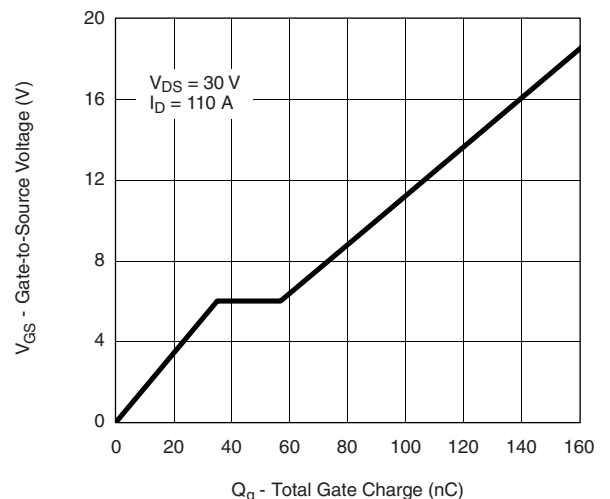
* Pb containing terminations are not RoHS compliant, exemptions may apply.

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	2.5		4	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			100	
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		0.0025	0.0031	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C			0.0049	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C			0.0059	
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		6500		pF
Output Capacitance	C _{oss}			1400		
Reverse Transfer Capacitance	C _{rss}			570		
Total Gate Charge ^c	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 110 A		90	150	nC
Gate-Source Charge ^c	Q _{gs}			35		
Gate-Drain Charge ^c	Q _{gd}			22		
Gate Resistance	R _g	f = 1 MHz	0.5	1.1	1.9	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.27 Ω I _D ≅ 110 A, V _{GEN} = 10 V, R _G = 2.5 Ω		145	220	ns
Rise Time ^c	t _r			35	55	
Turn-Off Delay Time ^c	t _{d(off)}			20	30	
Fall Time ^c	t _f			55	85	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				110	A
Pulsed Current	I _{SM}				240	
Forward Voltage ^a	V _{SD}	I _F = 85 A, V _{GS} = 0 V		1.1	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 85 A, di/dt = 100 A/μs		60	90	ns
Peak Reverse Recovery Charge	I _{RM(REC)}			2.5	5	A
Reverse Recovery Charge	Q _{rr}				0.075	0.22

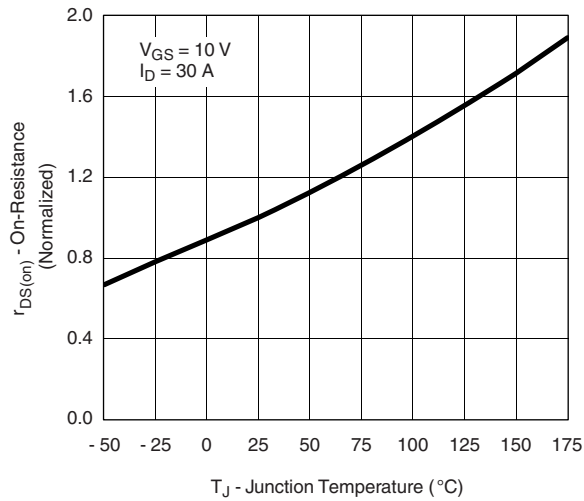
Notes:

- 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.

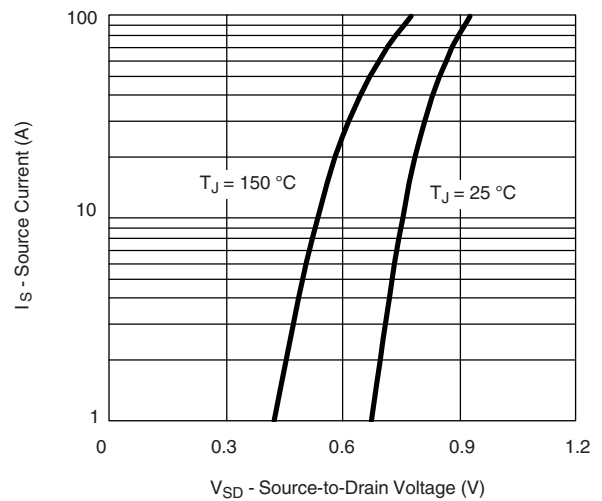
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

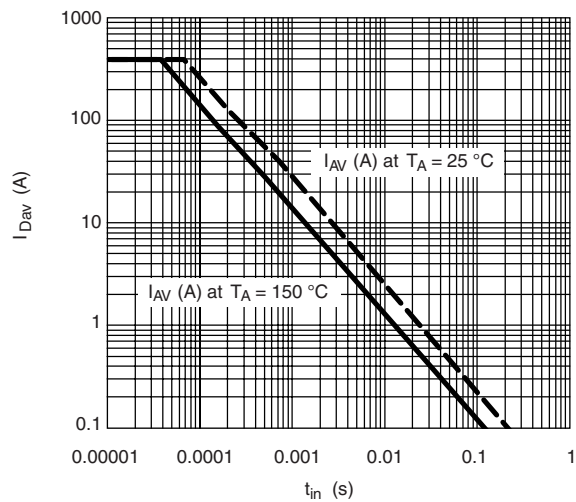
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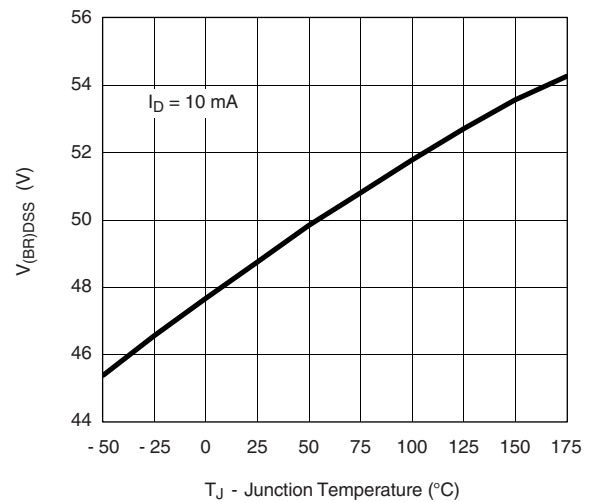
On-Resistance vs. Junction Temperature



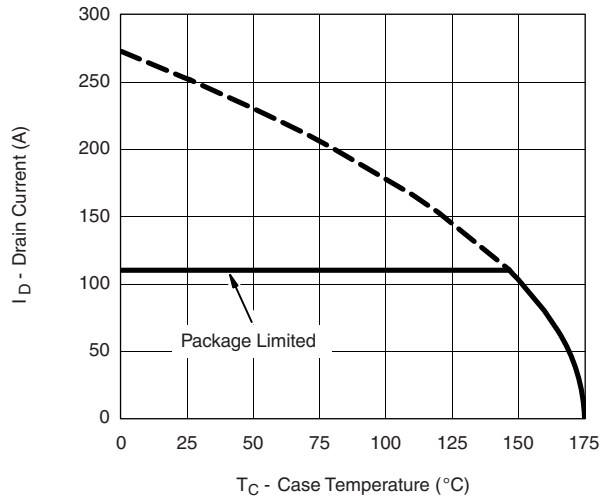
Source-Drain Diode Forward Voltage



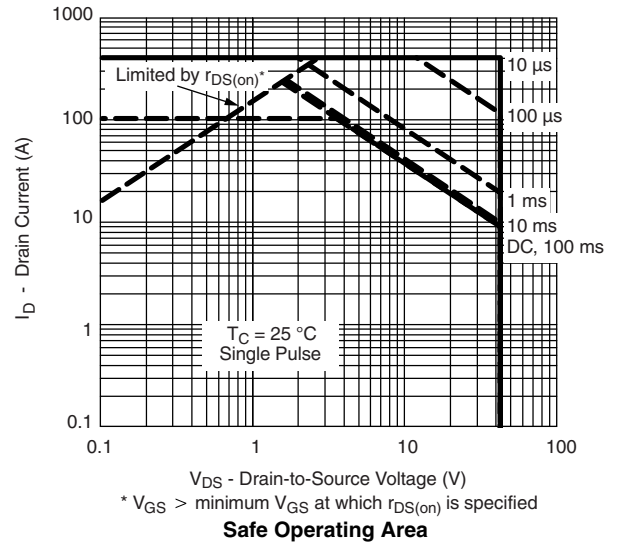
Avalanche Current vs. Time



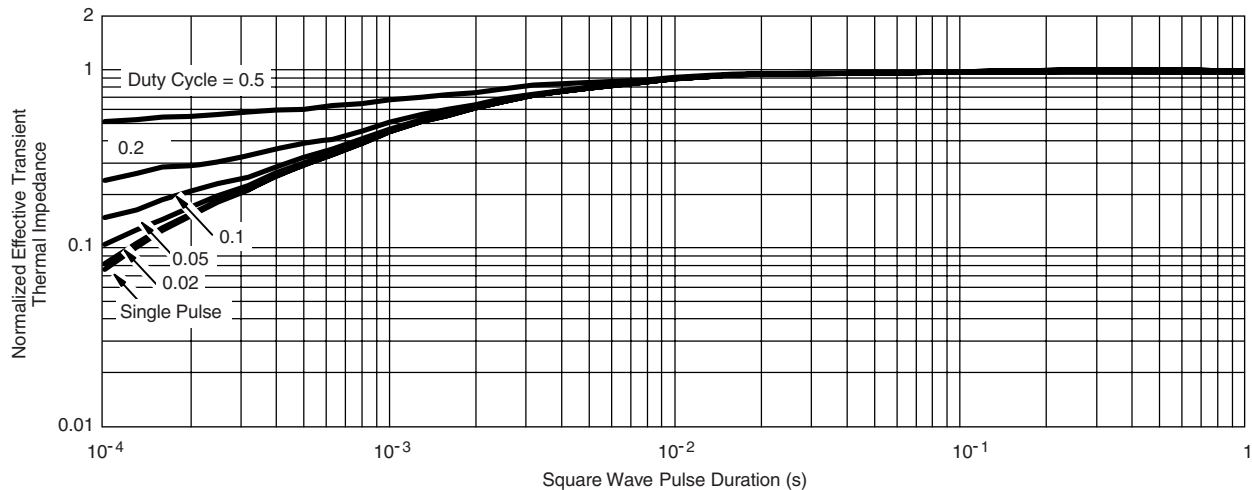
Drain Source Breakdown vs. Junction Temperature

**THERMAL RATINGS**

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



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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