



N-Channel 250-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
250	0.058 at $V_{GS} = 10$ V	45
	0.062 at $V_{GS} = 6$ V	43

FEATURES

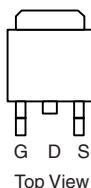
- TrenchFET® Power MOSFETS
- 175 °C Junction Temperature
- New Low Thermal Resistance Package

RoHS
COMPLIANT

APPLICATIONS

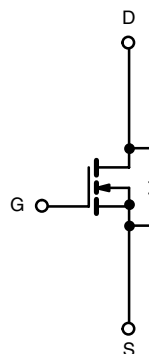
- Primary Side Switch
- Plasma Display Panel Sustainer Function

TO-263



Top View

Ordering Information: SUM45N25-58-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}	250	V
Typical Avalanche Voltage ^d		V_{DS} (Avalanche) _{Typ}	300	
Gate-Source Voltage		V_{GS}	± 30	
Continuous Drain Current ($T_J = 175$ °C)	$T_C = 25$ °C	I_D	45	A
	$T_C = 125$ °C		25	
Pulsed Drain Current		I_{DM}	90	
Avalanche Current		I_{AR}	35	mJ
Repetitive Avalanche Energy ^a	$L = 0.1$ mH	E_{AR}	61	
Maximum Power Dissipation ^a	$T_C = 25$ °C	P_D	375 ^b	W
	$T_A = 25$ °C ^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 (PCB Mount) ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.4	

Notes:

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

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

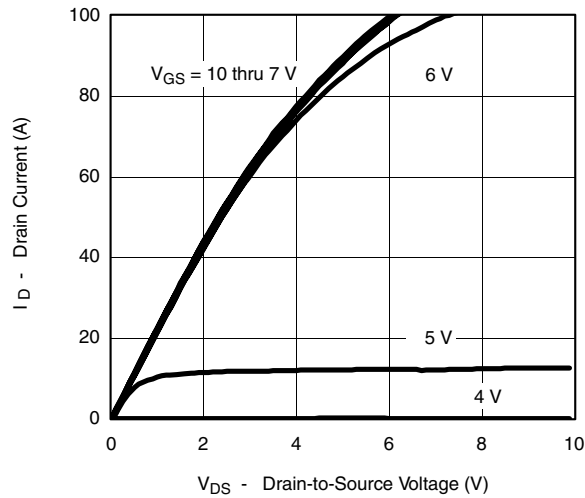
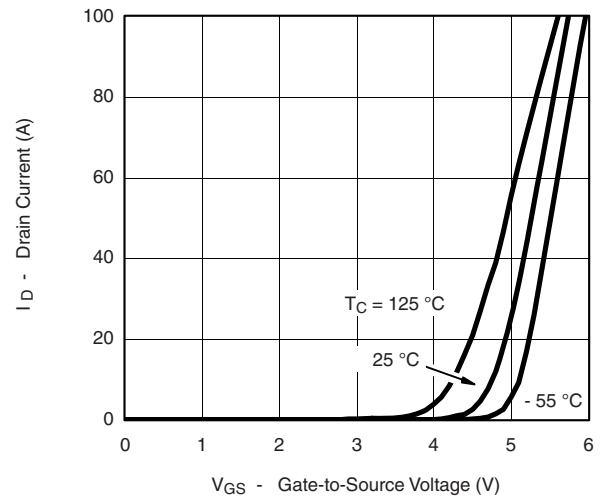
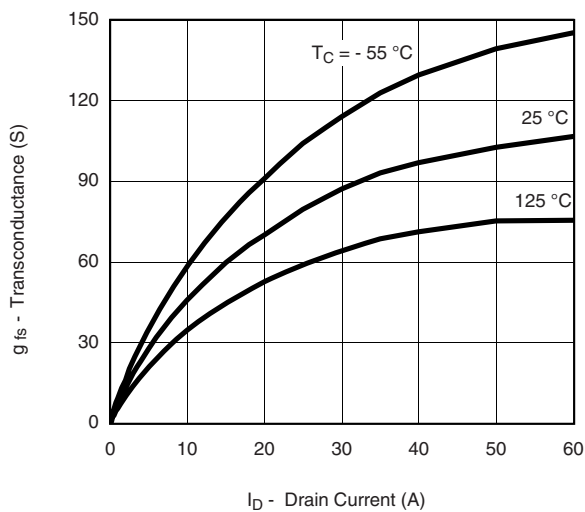
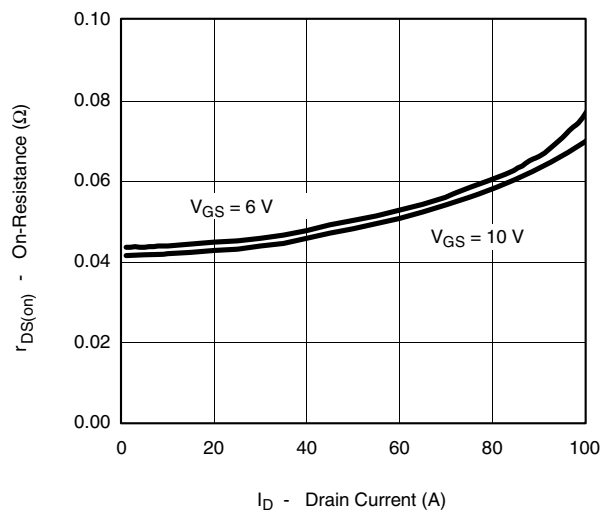
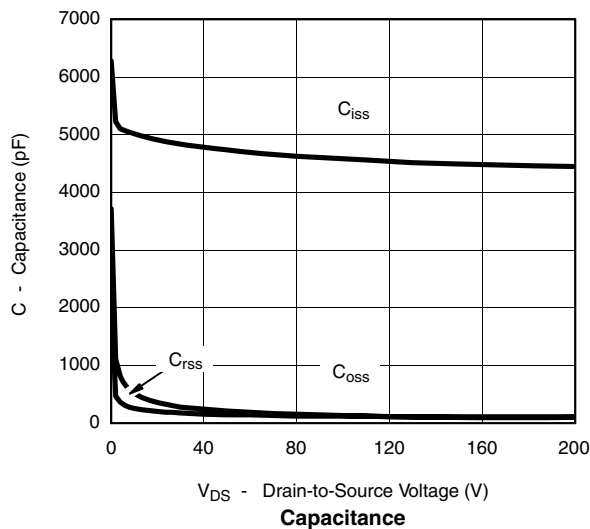
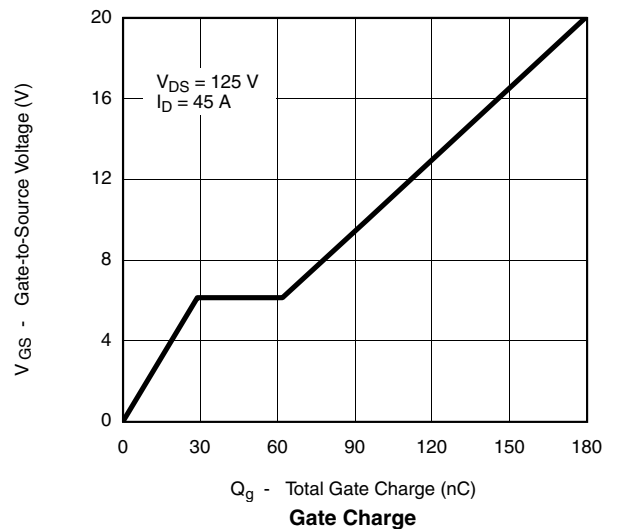
d. Guaranteed by design

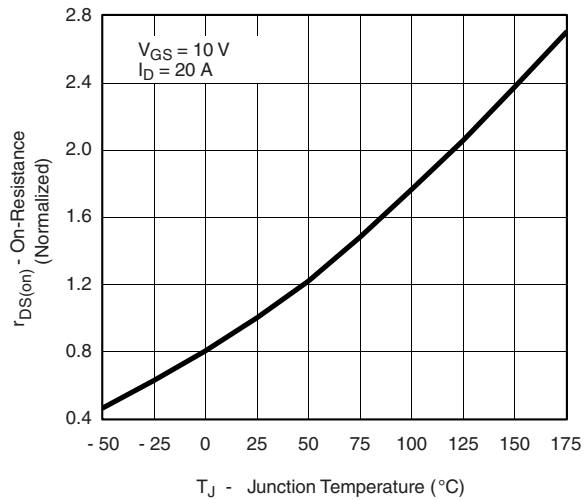
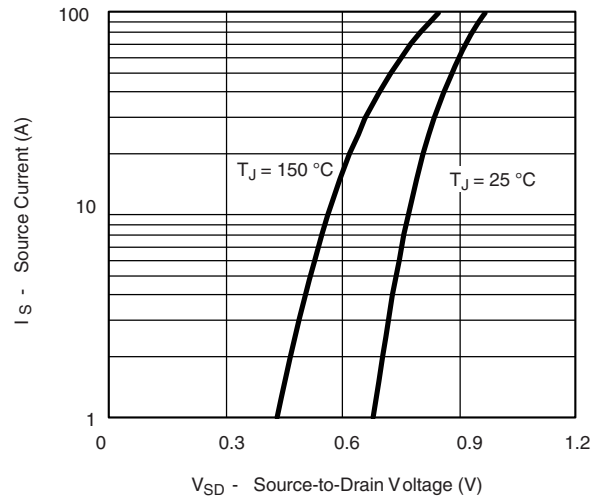
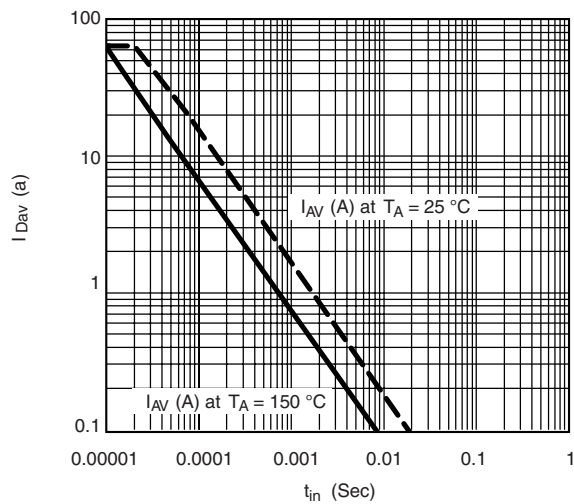
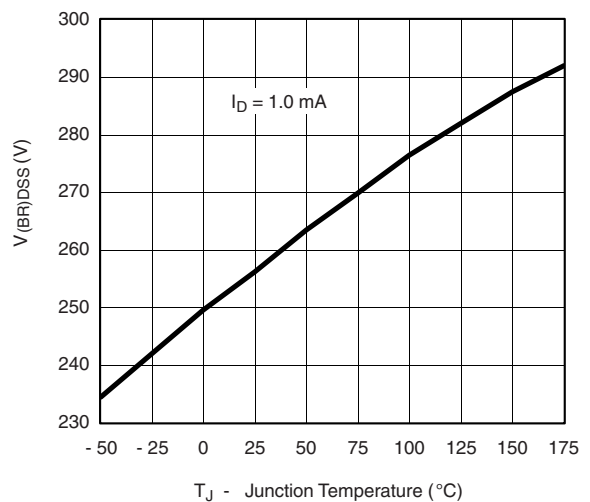
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{DS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	250			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 30\text{ V}$			± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 250\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 250\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$			50	
		$V_{DS} = 250\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 175\text{ }^{\circ}\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	70			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$		0.047	0.058	Ω
		$V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$			0.121	
		$V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$, $T_J = 175\text{ }^{\circ}\text{C}$			0.163	
		$V_{GS} = 6\text{ V}$, $I_D = 15\text{ A}$		0.049	0.062	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 20\text{ A}$		70		S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$		5000		pF
Output Capacitance	C_{oss}			300		
Reverse Transfer Capacitance	C_{rss}			170		
Total Gate Charge ^c	Q_g	$V_{DS} = 125\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 45\text{ A}$		95	140	nC
Gate-Source Charge ^c	Q_{gs}			28		
Gate-Drain Charge ^c	Q_{gd}			34		
Gate Resistance	R_g	$f = 1\text{ MHz}$		1.6		Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 100\text{ V}$, $R_L = 2.78\text{ }\Omega$ $I_D \cong 45\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 2.5\text{ }\Omega$		22	35	ns
Rise Time ^c	t_r			220	330	
Turn-Off Delay Time ^c	$t_{d(off)}$			40	60	
Fall Time ^c	t_f			145	220	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^{\circ}\text{C}$) ^b						
Continuous Current	I_S				45	A
Pulsed Current	I_{SM}				70	
Forward Voltage ^a	V_{SD}	$I_F = 45\text{ A}$, $V_{GS} = 0\text{ V}$		1.0	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 45\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		150	225	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			12	18	A
Reverse Recovery Charge	Q_{rr}			0.9	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.

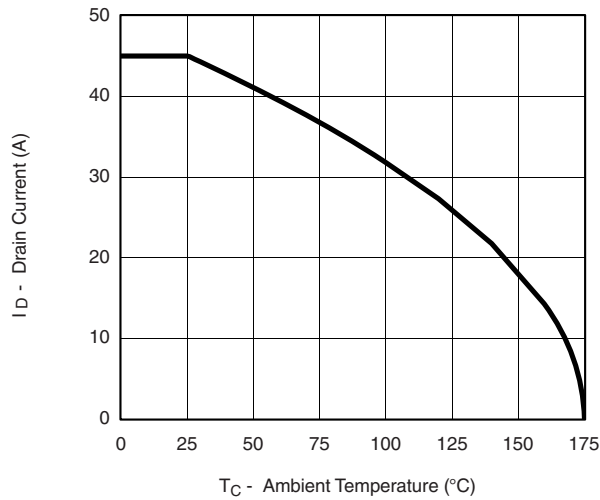
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

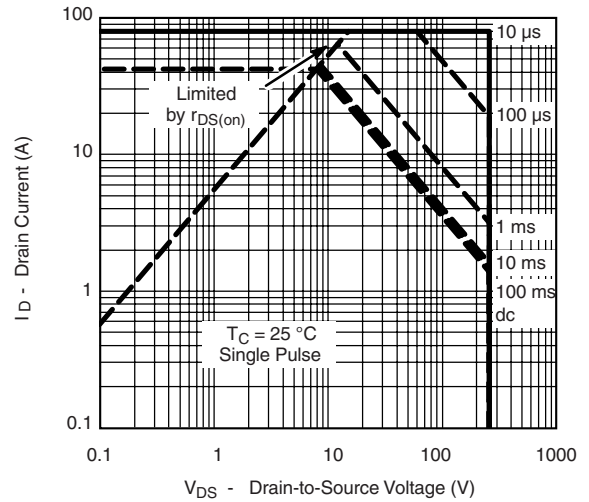
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**On-Resistance vs. Junction Temperature****Source-Drain Diode Forward Voltage****Avalanche Current vs. Time****Drain Source Breakdown vs. Junction Temperature**



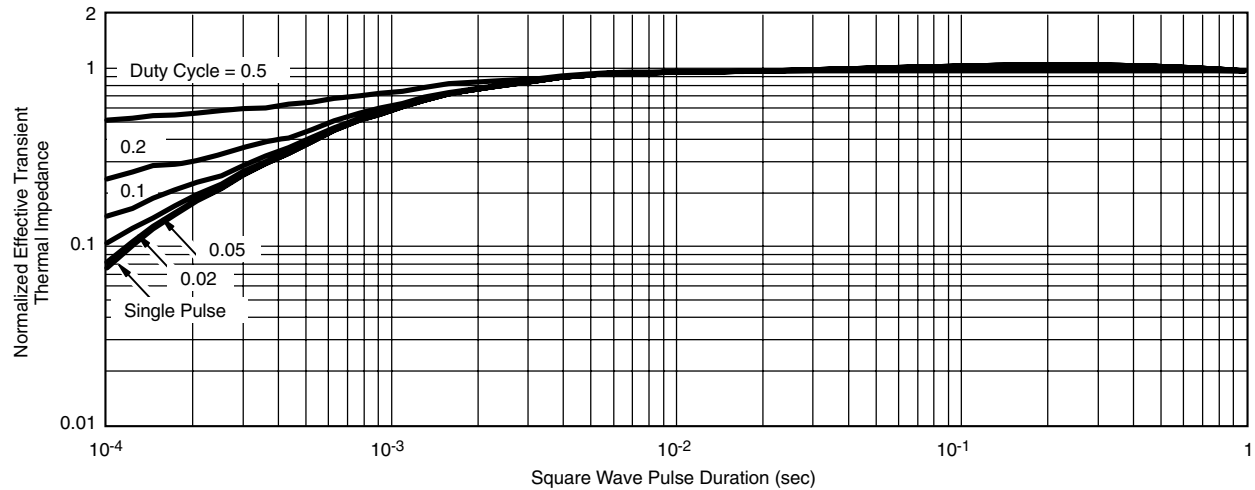
THERMAL RATINGS



Maximum Avalanche and Drain Current
vs. Case Temperature



Safe Operating Area, Case Temperature



Normalized Thermal Transient Impedance, Junction-to-Case

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