

N-Channel 60-V (D-S), 175 °C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
60	0.0093 at $V_{GS} = 10$ V	90
	0.0135 at $V_{GS} = 4.5$ V	62

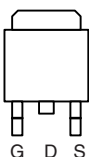
FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature



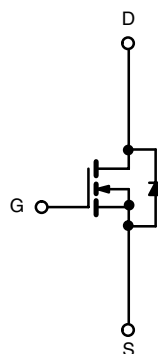
Available
RoHS*
COMPLIANT

TO-263



Top View

DRAIN connected to TAB



N-Channel MOSFET

Ordering Information: SUM75N06-09L-E3 (Lead (Pb)-free)

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	I_D	90	A
		53	
Pulsed Drain Current	I_{DM}	160	
Avalanche Current	I_{AR}	50	
Repetitive Avalanche Energy ^a	E_{AR}	125	mJ
Power Dissipation	P_D	125 ^b	W
		3.75 ^c	
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}	1.2	

Notes:

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

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

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

MOSFET 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 _{GS} = 0 V, I _D = 250 μA	60			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1	2	3	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			1	μA
		V _{DS} = 60 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 60 V, V _{GS} = 0 V, T _J = 175 °C			150	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	75			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 30 A		0.0075	0.0093	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C			0.0163	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C			0.024	
		V _{GS} = 4.5 V, I _D = 30 A		0.0105	0.0135	
		V _{GS} = 4.5 V, I _D = 30 A, T _J = 125 °C			0.0224	
		V _{GS} = 4.5 V, I _D = 30 A, T _J = 175 °C			0.030	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	25	75		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		2400		pF
Output Capacitance	C _{oss}			430		
Reversen Transfer Capacitance	C _{rss}			210		
Total Gate Charge ^c	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 90 A		47	75	nC
Gate-Source Charge ^c	Q _{gs}			12		
Gate-Drain Charge ^c	Q _{gd}			13		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.4 Ω I _D ≅ 90 A, V _{GEN} = 10 V, R _G = 2.5 Ω		7	12	ns
Rise Time ^c	t _r			30	50	
Turn-Off Delay Time ^c	t _{d(off)}			25	40	
Fall Time ^c	t _f			12	20	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				90	A
Pulsed Current	I _{SM}			160	180	
Forward Voltage ^a	V _{SD}	I _F = 90 A, V _{GS} = 0 V			1.4	V
Reverse Recovery Time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs		40	80	ns
Peak Reverse Recovery Current	I _{RM(REC)}			2	4	A
Reverse Recovery Charge	Q _{rr}				0.040	0.16

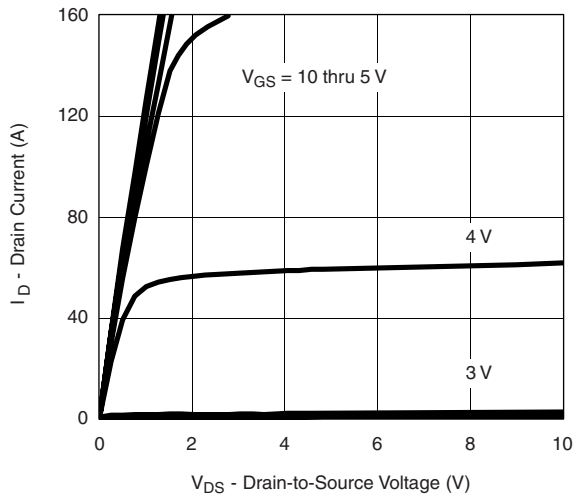
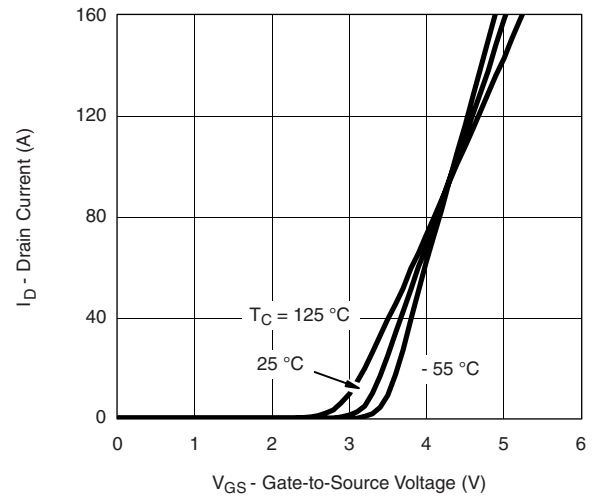
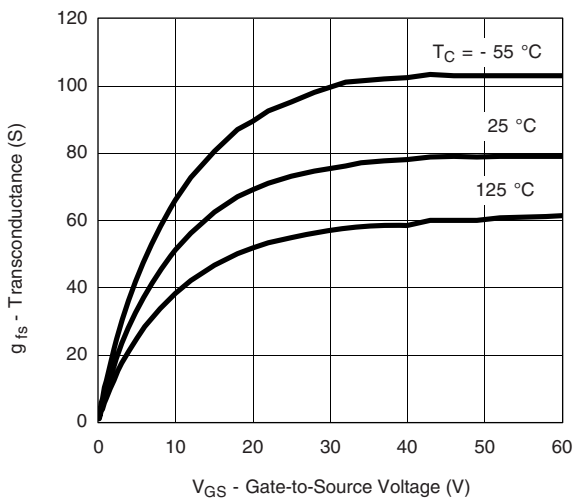
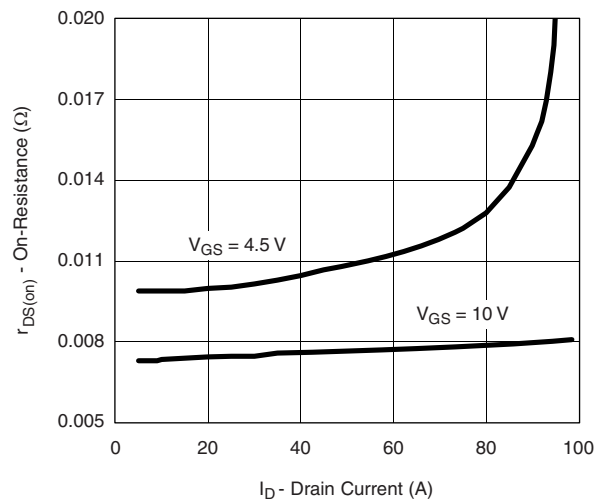
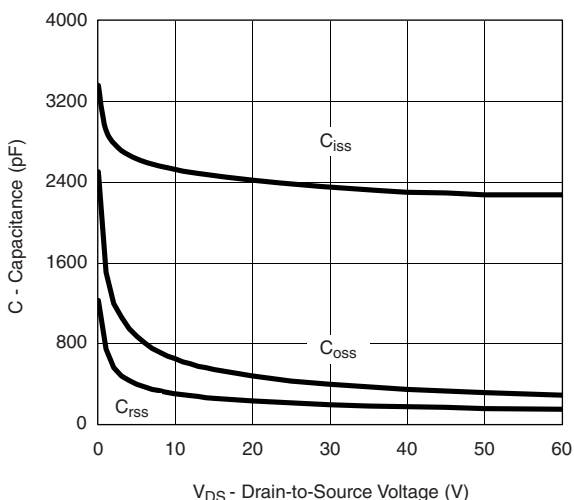
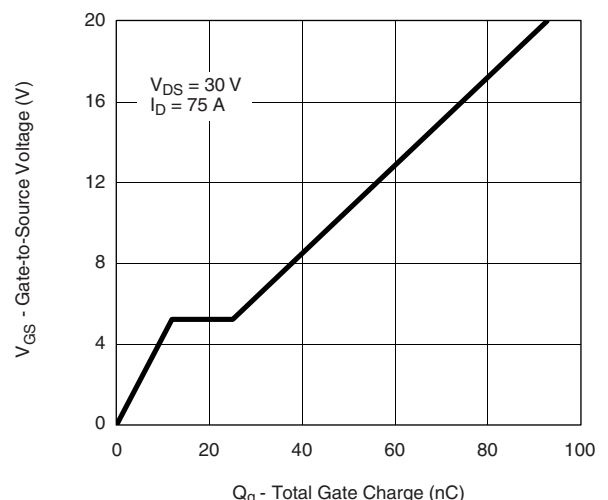
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

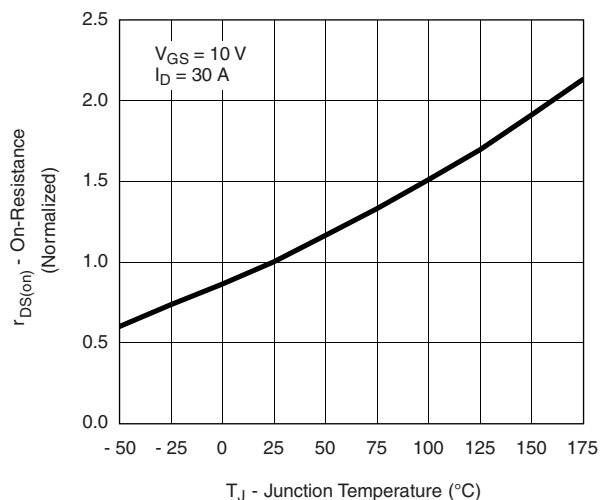
b. Guaranteed by design, not subject to production testing.

c. Independent of operating temperature.

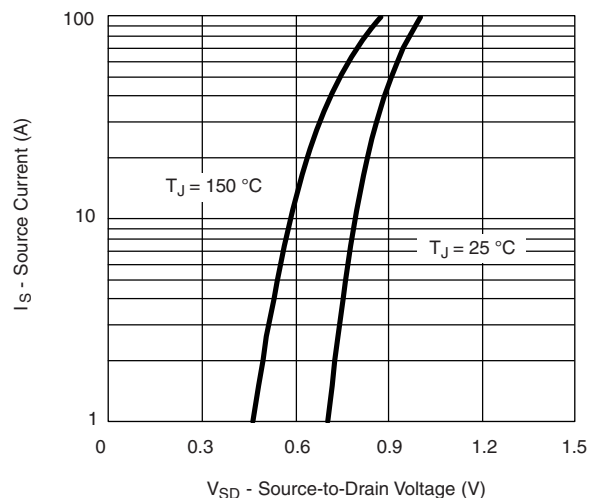
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

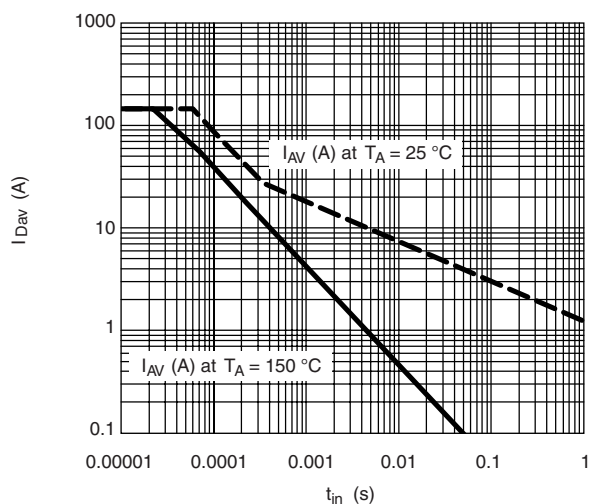
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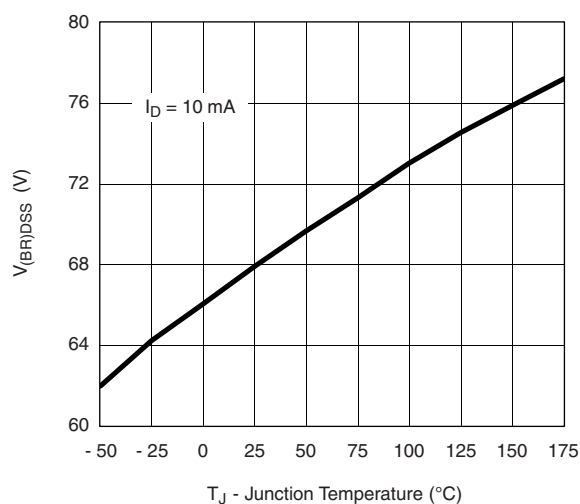
On-Resistance vs. Junction Temperature



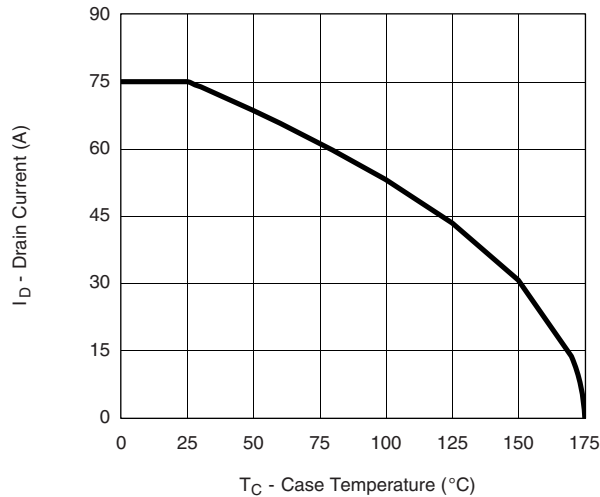
Source-Drain Diode Forward Voltage



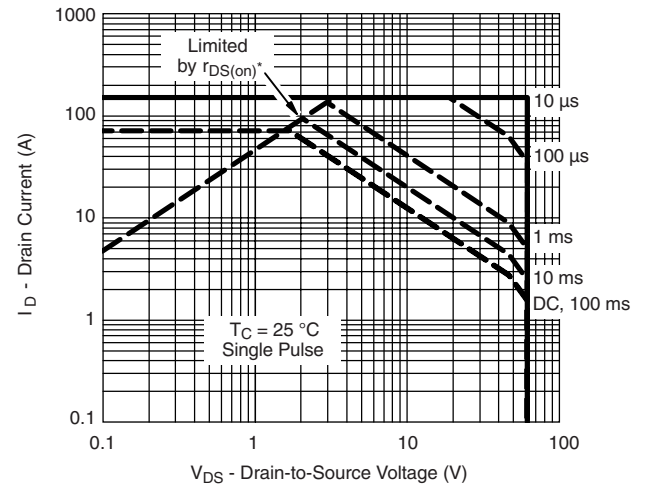
Avalanche Current vs. Time



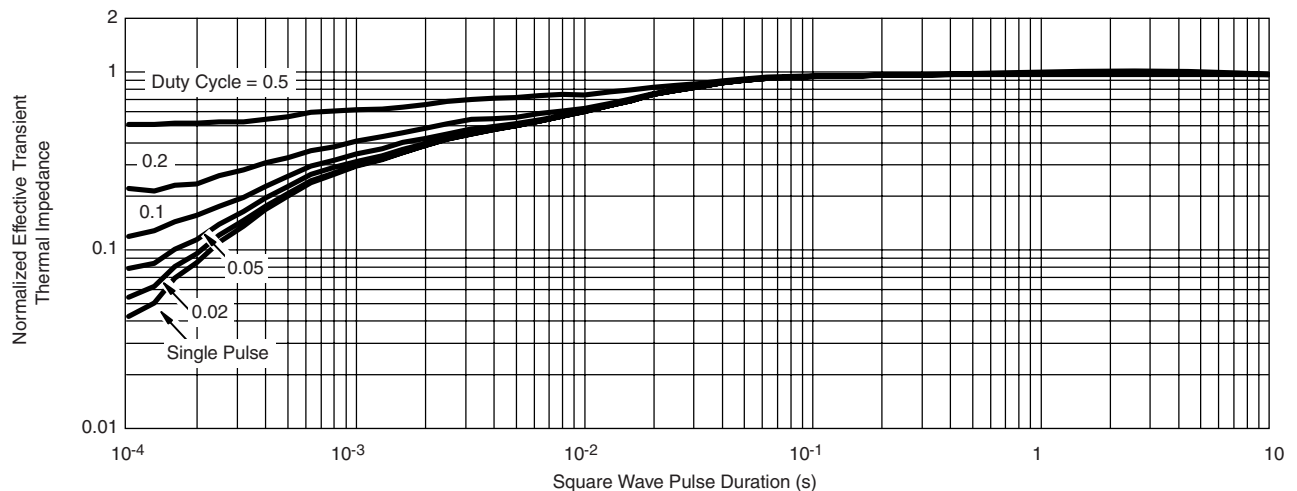
Drain Source Breakdown vs. Junction Temperature

**THERMAL RATINGS**

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



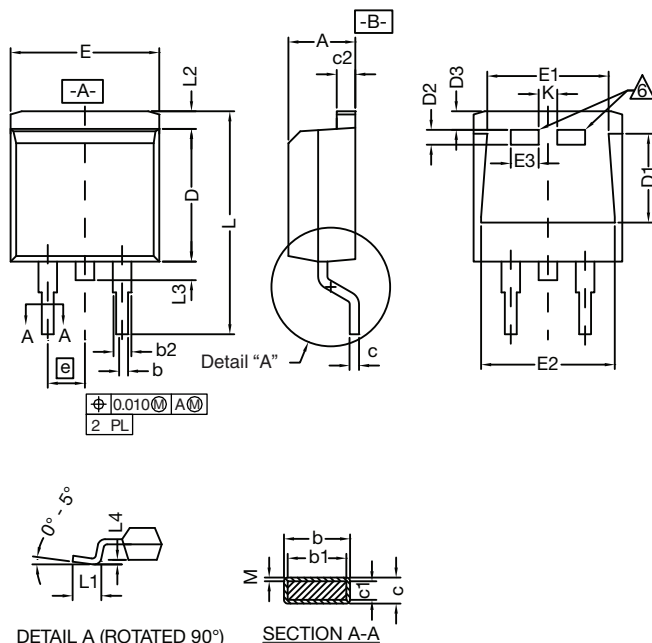
Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Case

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TO-263 (D²PAK): 3-LEAD



DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.160	0.190	4.064	4.826
b		0.020	0.039	0.508	0.990
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
c2		0.045	0.055	1.143	1.397
D		0.340	0.380	8.636	9.652
D1		0.220	0.240	5.588	6.096
D2		0.038	0.042	0.965	1.067
D3		0.045	0.055	1.143	1.397
E		0.380	0.410	9.652	10.414
E1		0.245	-	6.223	-
E2		0.355	0.375	9.017	9.525
E3		0.072	0.078	1.829	1.981
e		0.100 BSC		2.54 BSC	
K		0.045	0.055	1.143	1.397
L		0.575	0.625	14.605	15.875
L1		0.090	0.110	2.286	2.794
L2		0.040	0.055	1.016	1.397
L3		0.050	0.070	1.270	1.778
L4		0.010 BSC		0.254 BSC	
M		-	0.002	-	0.050
ECN: T10-0738-Rev. J, 03-Jan-11					
DWG: 5843					

Notes

1. Plane B includes maximum features of heat sink tab and plastic.
2. No more than 25 % of L1 can fall above seating plane by max. 8 mils.
3. Pin-to-pin coplanarity max. 4 mils.
4. *: Thin lead is for SUB, SYB.
Thick lead is for SUM, SYM, SQM.
5. Use inches as the primary measurement.
6. This feature is for thick lead.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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