

N-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
60	0.012 at $V_{GS} = 10$ V	60 ^d	33

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC

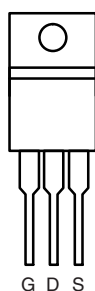


RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

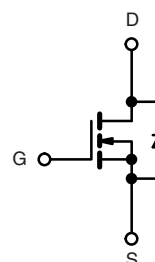
- Synchronous Rectifier
- Power Supplies

TO-220AB



Top View

Ordering Information: SUP60N06-12P-E3 (Lead (Pb)-free)
SUP60N06-12P-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	60 ^d	A
		54 ^d	
Pulsed Drain Current	I_{DM}	80	
Avalanche Current	I_{AS}	40	
Single Avalanche Energy ^a	E_{AS}	80	mJ
Maximum Power Dissipation ^a	P_D	100 ^b	W
		3.25	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°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}	1.25	

Notes:

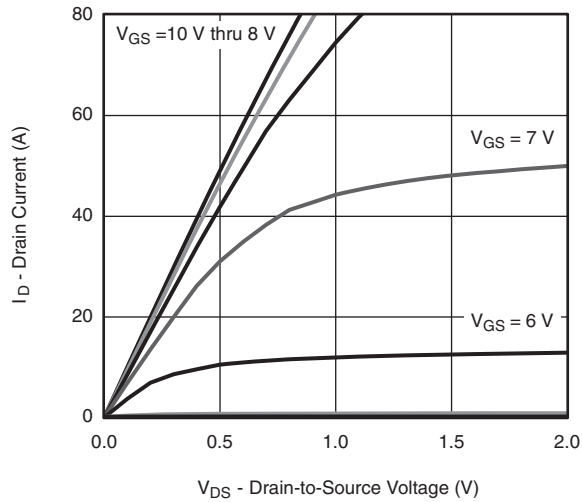
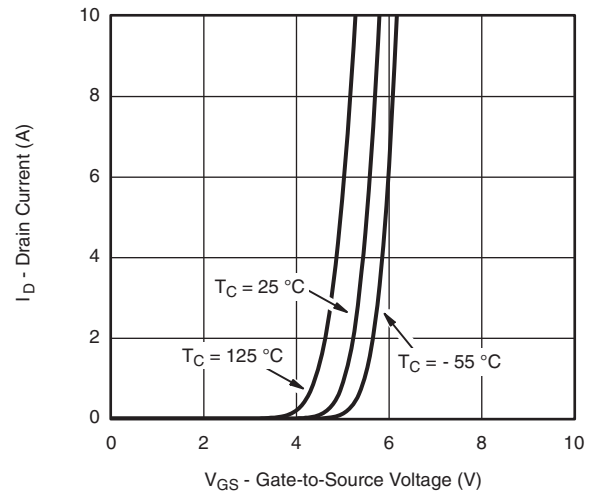
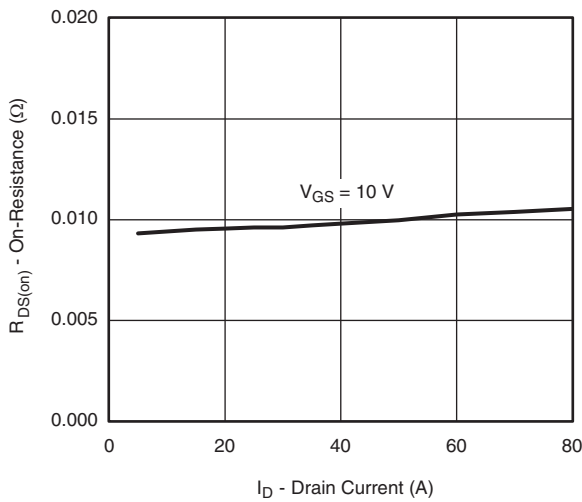
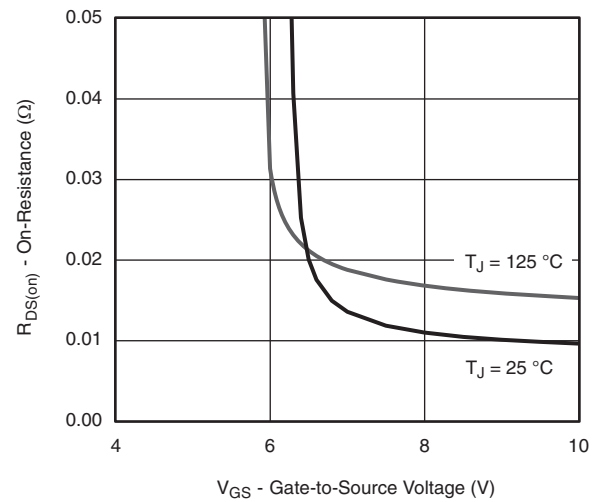
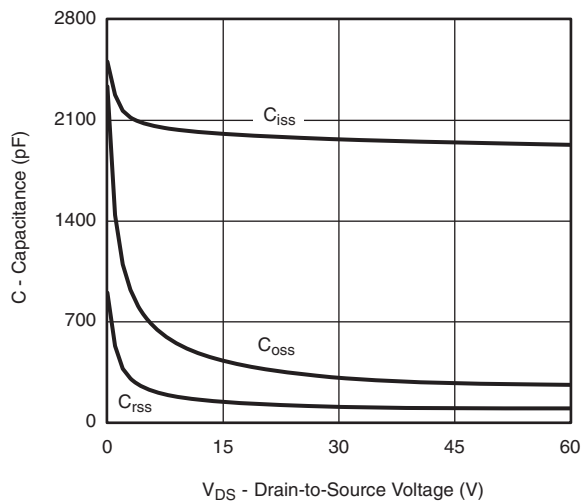
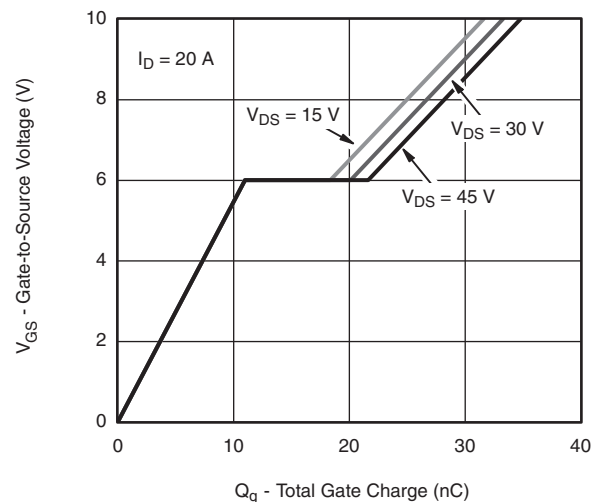
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When Mounted on 1" square PCB (FR-4 material).
- Package limited.

SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{DS} = 0 V, I _D = 250 μA	60			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2.5		4.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 250	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 = 150 °C			250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	80			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 30 A		0.0098	0.012	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C		0.0155	0.019	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 15 A		37		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 30 V, f = 1 MHz		1970		pF
Output Capacitance	C _{oss}			310		
Reverse Transfer Capacitance	C _{rss}			110		
Total Gate Charge ^c	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 20 A		33	55	nC
Gate-Source Charge ^c	Q _{gs}			11		
Gate-Drain Charge ^c	Q _{gd}			9		
Gate Resistance	R _g	f = 1 MHz	0.3	1.4	2.8	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 1.53 Ω I _D ≅ 20 A, V _{GEN} = 10 V, R _g = 1 Ω		11	20	ns
Rise Time ^c	t _r			11	20	
Turn-Off Delay Time ^c	t _{d(off)}			16	30	
Fall Time ^c	t _f			8	15	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				60	A
Pulsed Current	I _{SM}				80	
Forward Voltage ^a	V _{SD}	I _F = 10 A, V _{GS} = 0 V		0.84	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 10 A, dI/dt = 100 A/μs		40	80	ns
Peak Reverse Recovery Current	I _{RM(REC)}			3.2	5.0	A
Reverse Recovery Charge	Q _{rr}				64	120

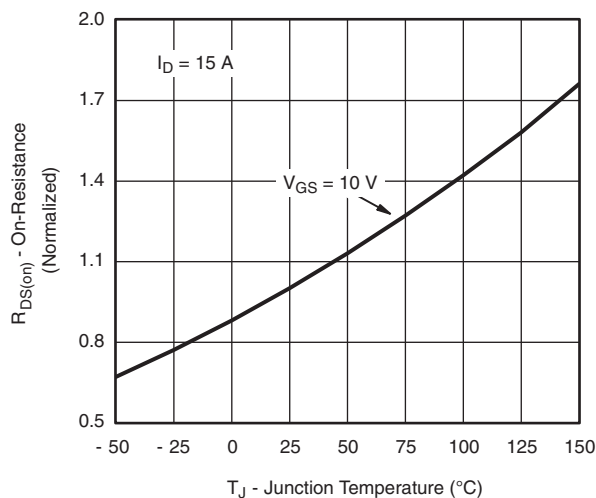
Notes:

- 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.

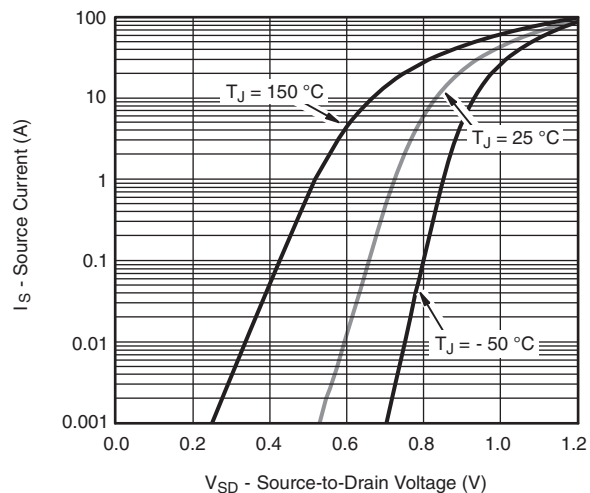
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

On-resistance vs. Gate-to-Source Voltage

Capacitance

Gate Charge

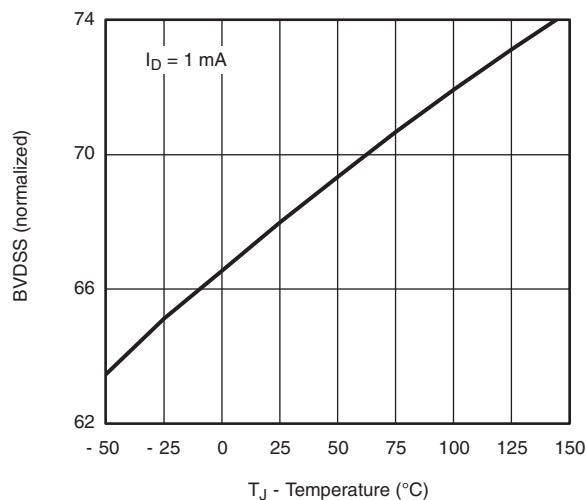
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



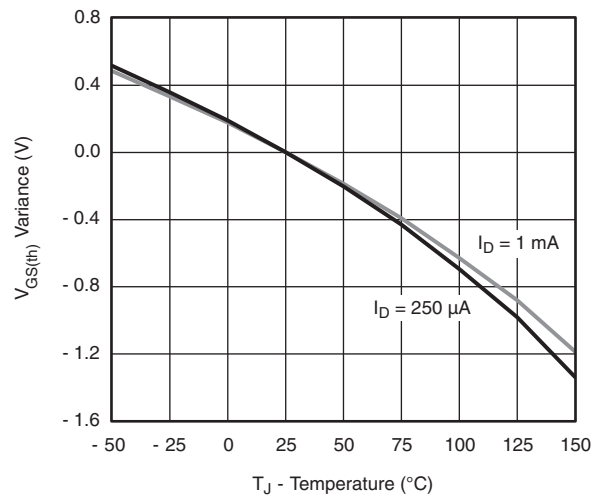
On-Resistance vs. Junction Temperature



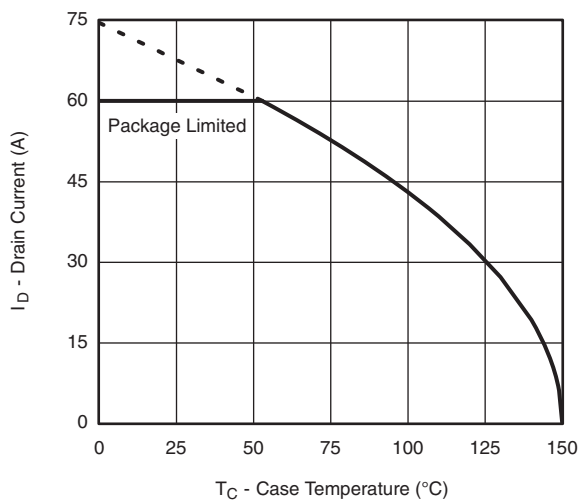
Source-Drain Diode Forward Voltage



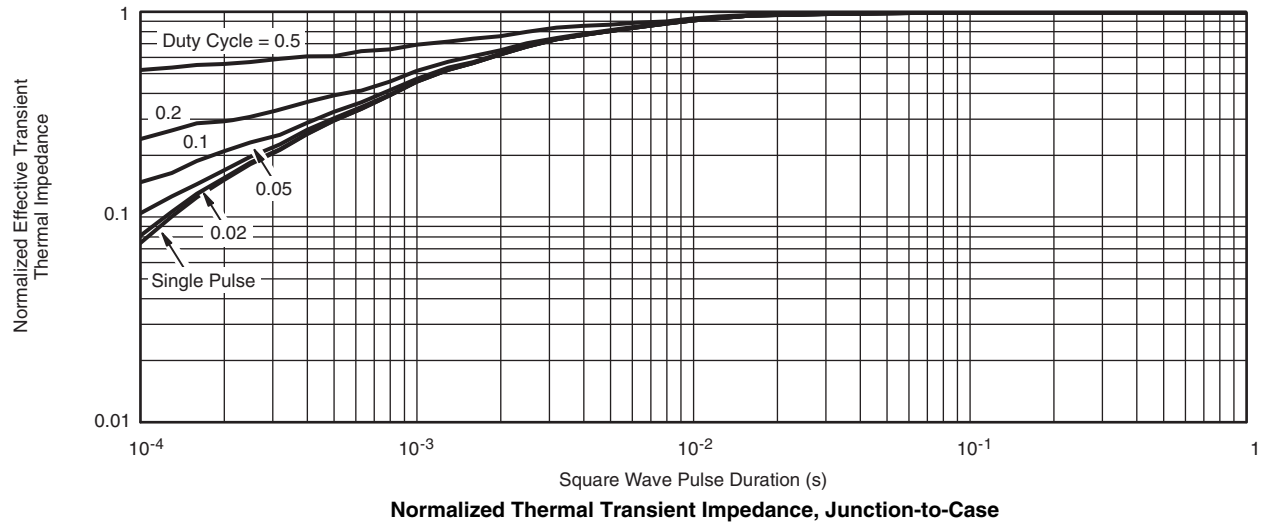
Drain-Source Breakdown vs. Junction Temperature



Threshold Voltage



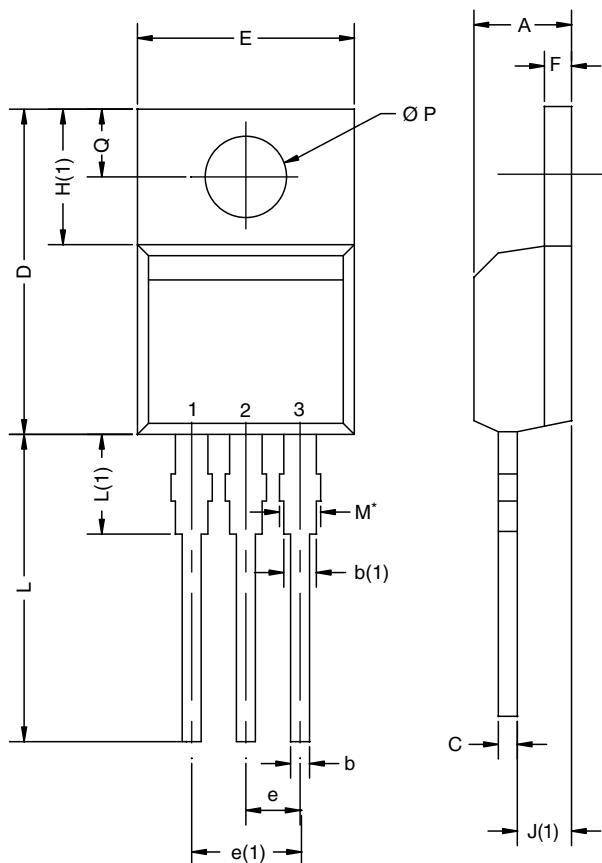
Maximum Drain Current vs. Case Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


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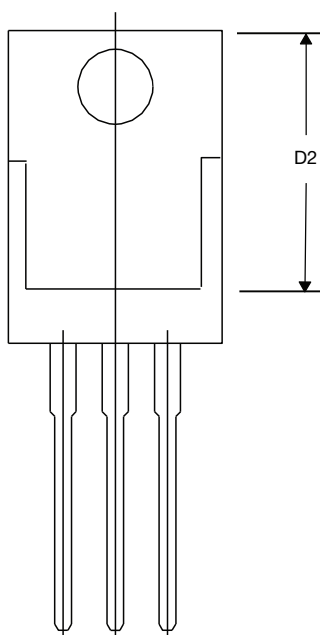


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: T14-0413-Rev. P, 16-Jun-14
DWG: 5471

Note

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM





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