N-Channel 100-V (D-S) 175 °C MOSFET

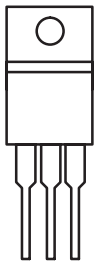
PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
100	0.0105 at V_{GS} = 10 V	85[a]
	0.012 at V_{GS} = 4.5 V	

FEATURES

- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

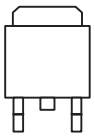
TO-220AB



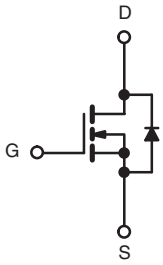
Top View
SUP85N10-10

DRAIN connected to TAB

TO-263



Top View
SUB85N10-10



N-Channel MOSFET

ORDERING INFORMATION	
Package	**Lead (Pb)-free**
TO-220AB	SUP85N10-10-E3
TO-263	SUB85N10-10-E3

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	85[a]	A
	T_C = 125 °C		60[a]	
Pulsed Drain Current		I_{DM}	240	
Avalanche Current	L = 0.1 mH	I_{AS}	75	
Single Pulse Avalanche Energy[b]		E_{AS}	280	mJ
Maximum Power Dissipation[b]	T_C = 25 °C (TO-220AB and TO-263)	P_D	250[c]	W
	T_A = 25 °C (TO-263)[d]		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 (TO-263)[d]	R_{thJA}	40	°C/W
	Free Air (TO-220AB)		62.5	
Junction-to-Case		R_{thJC}	0.6	

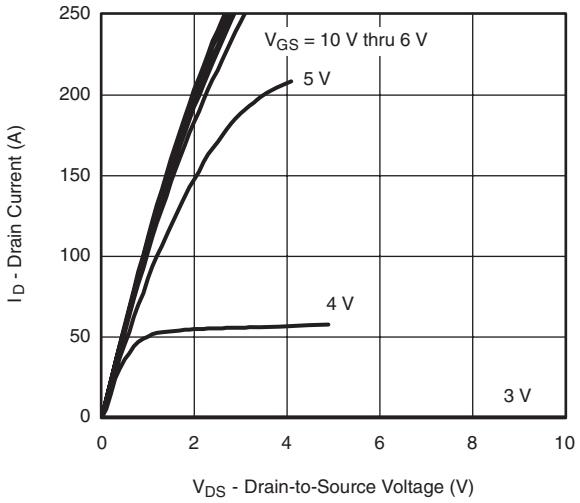
Notes:
a. Package limited.
b. Duty cycle ≤ 1 %.
c. See SOA curve fo voltage derating.
d. When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	100			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1		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} = 100 V, V_{GS} = 0 V			1	µA
		V_{DS} = 100 V, V_{GS} = 0 V, T_J = 125 °C			50	
		V_{DS} = 100 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		0.0085	0.0105	Ω
		V_{GS} = 4.5 V, I_D = 20 A		0.010	0.012	
		V_{GS} = 10 V, I_D = 30 A, T_J = 125 °C			0.017	
		V_{GS} = 10 V, I_D = 30 A, T_J = 175 °C			0.022	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	25			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		6550		pF
Output Capacitance	C_{oss}			665		
Reverse Transfer Capacitance	C_{rss}			265		
Total Gate Charge[c]	Q_g	V_{DS} = 50 V, V_{GS} = 10 V, I_D = 85 A		105	160	nC
Gate-Source Charge[c]	Q_{gs}			17		
Gate-Drain Charge[c]	Q_{gd}			23		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 50 V, R_L = 0.6 Ω I_D ≅ 85 A, V_{GEN} = 10 V, R_g = 2.5 Ω		12	25	ns
Rise Time[c]	t_r			90	135	
Turn-Off DelayTime[c]	$t_{d(off)}$			55	85	
Fall Time[c]	t_f			130	195	
Source-Drain Diode Ratings and Characteristics T_C = 25 °C[b]						
Continuous Current	I_S				85	A
Pulsed Current	I_{SM}				240	
Forward Voltage[a]	V_{SD}	I_F = 85 A, V_{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 50 A, dI/dt = 100 A/µs		85	140	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			4.5	7	A
Reverse Recovery Charge	Q_{rr}			0.17	0.35	µC

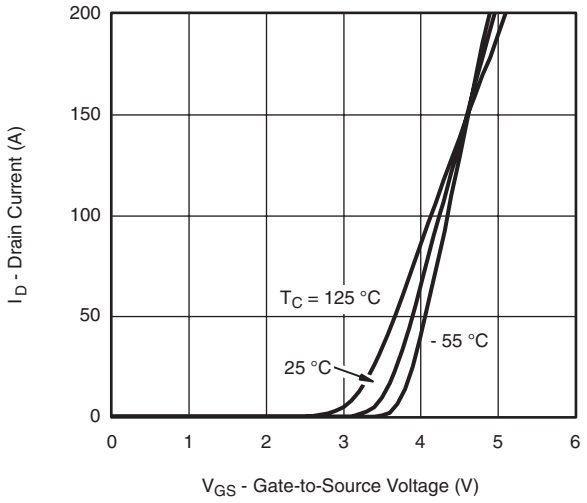
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

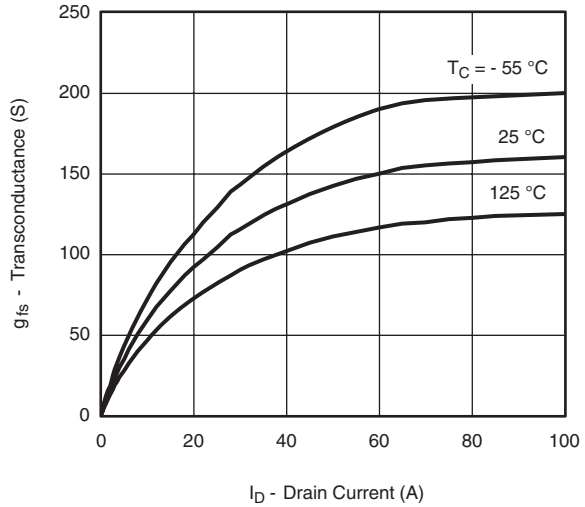
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



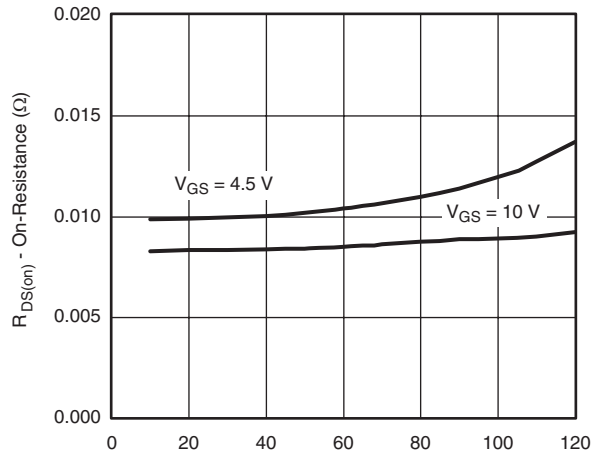
Output Characteristics



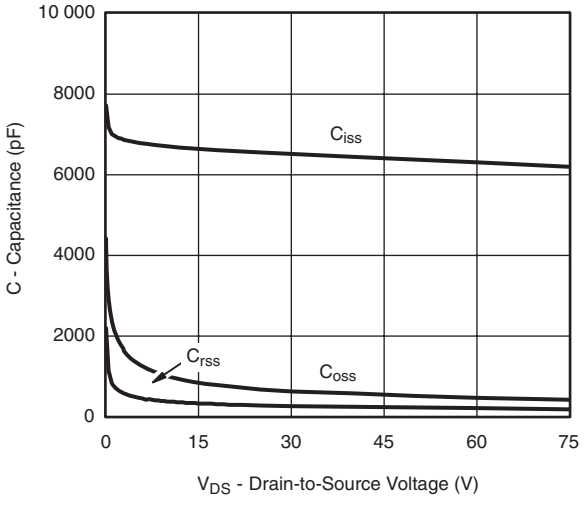
Transfer Characteristics



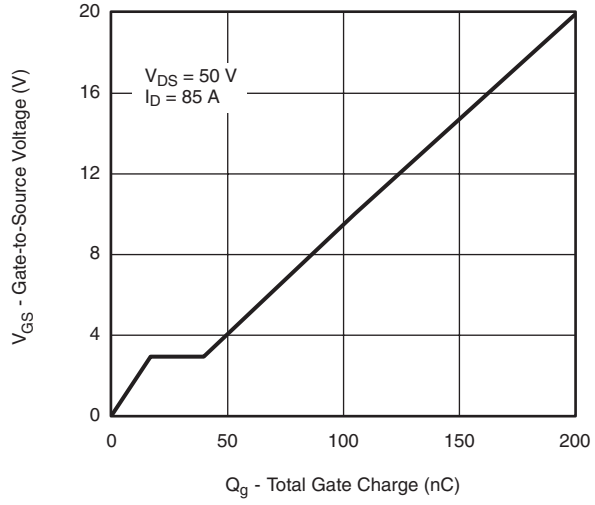
Transconductance



On-Resistance vs. Drain Current

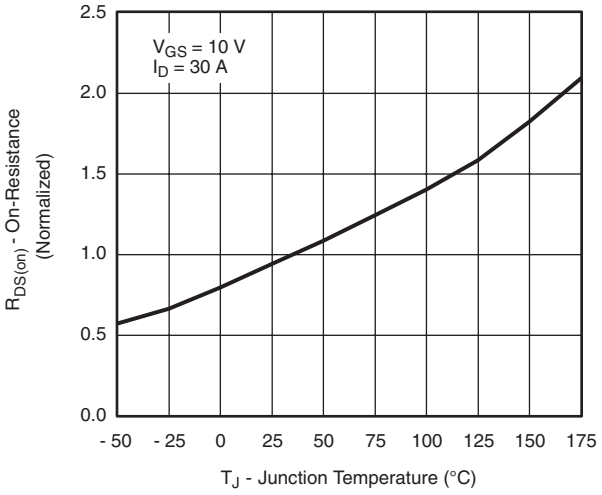


Capacitance

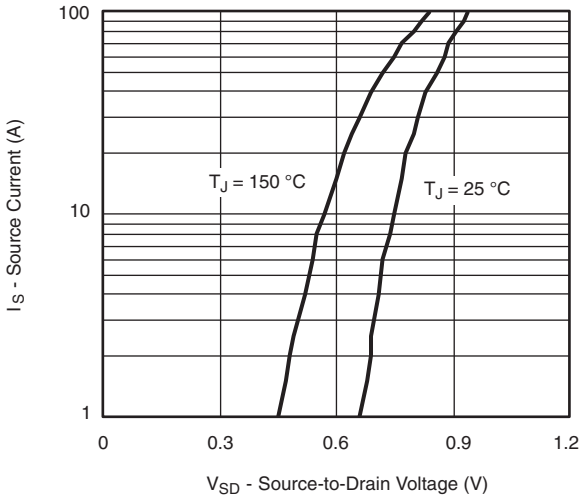


Gate Charge

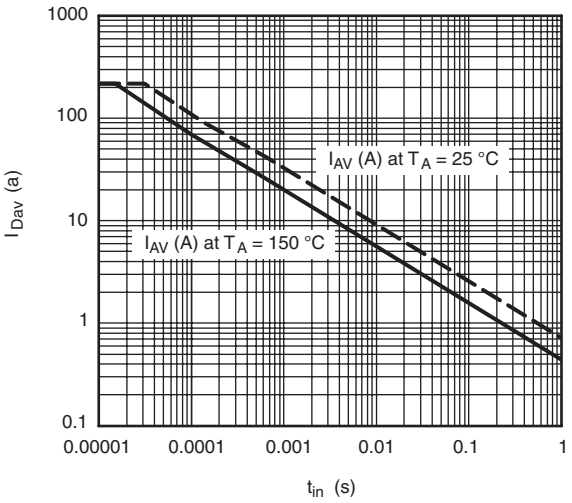
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



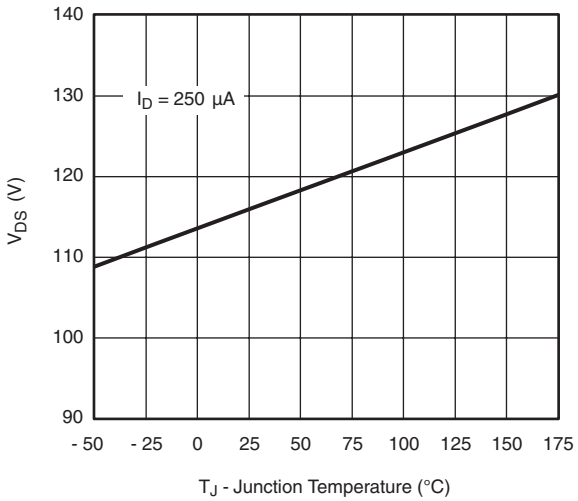
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

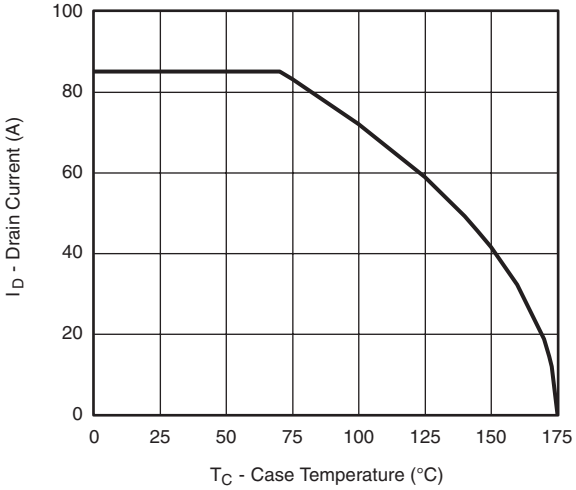


Avalanche Current vs. Time

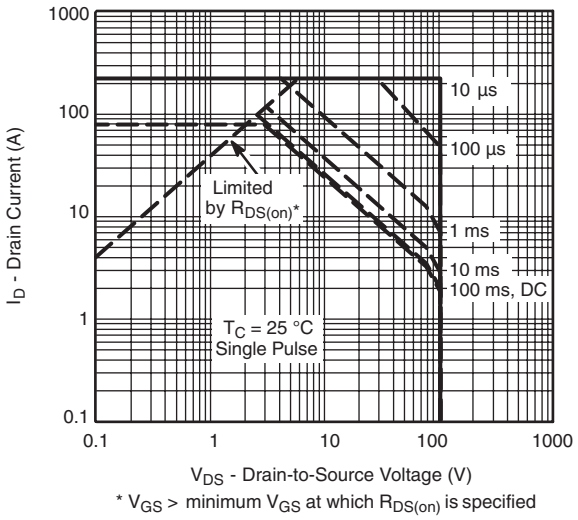


T_J - Drain-Source Breakdown vs. Junction-Temperature

THERMAL RATINGS

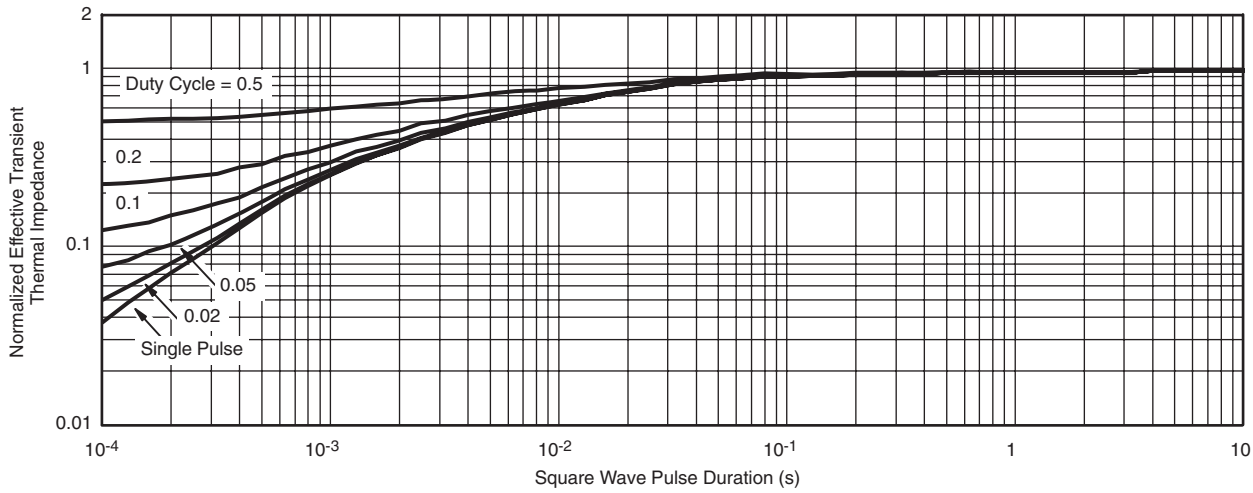


Maximum Avalanche and Drain Current vs. Case Temperature



* 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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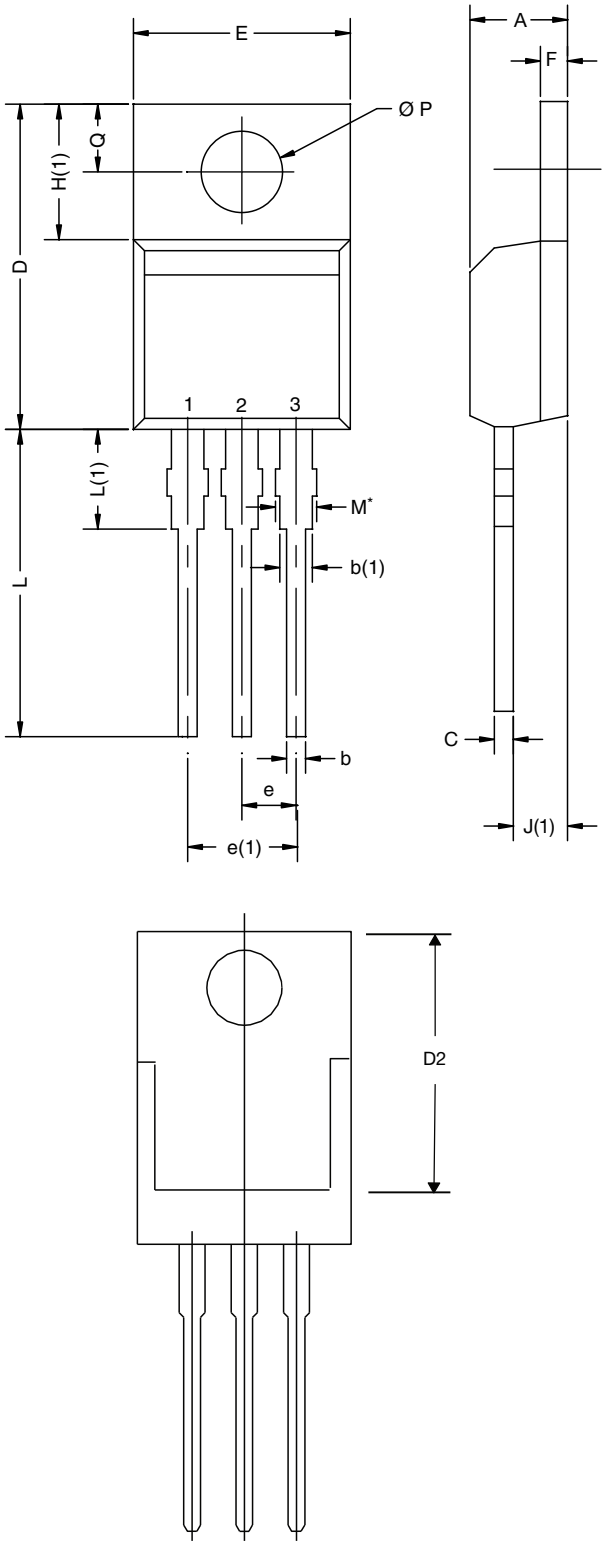
TO-220AB



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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