

SUP85N02-03-E3-VB Datasheet

N-Channel 20-V (D-S) MOSFET


RoHS
 COMPLIANT

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a
20	0.004 @ $V_{GS} = 4.5$ V	100
	0.005 @ $V_{GS} = 2.5$ V	95

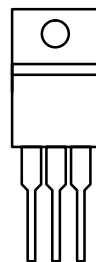
FEATURES

- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2011/65/EU

APPLICATIONS

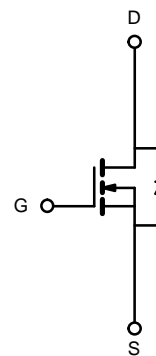
- OR-ing
- Server
- DC/DC

TO-220AB



G D S

Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 12	
Continuous Drain Current ($T_J = 175^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D	100	A
	$T_C = 100^\circ\text{C}$		85	
Pulsed Drain Current		I_{DM}	260	
Avalanche Current		I_{AR}	35	
Repetitive Avalanche Energy ^b	$L = 0.1$ mH	E_{AR}	45	mJ
	$T_C = 25^\circ\text{C}$		125 ^a	
Power Dissipation		P_D	125 ^a	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS				
Parameter		Symbol	Limit	Unit
Junction-to-Ambient	PCB Mount (TO-263) ^c	R_{thJA}	40	$^\circ\text{C/W}$
	Free Air (TO-220AB)		62.5	
Junction-to-Case		R_{thJC}	1.25	

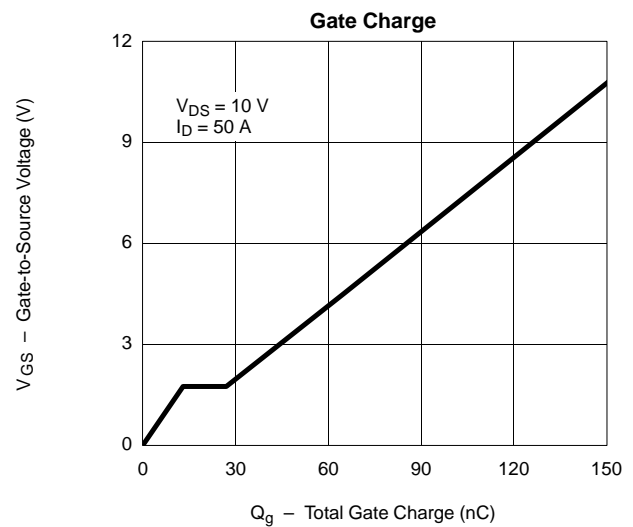
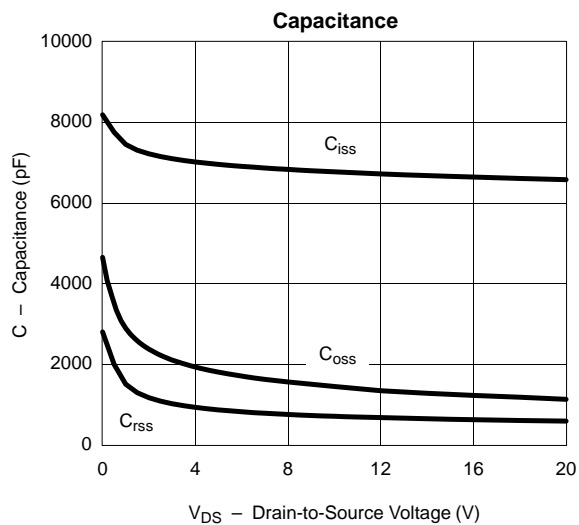
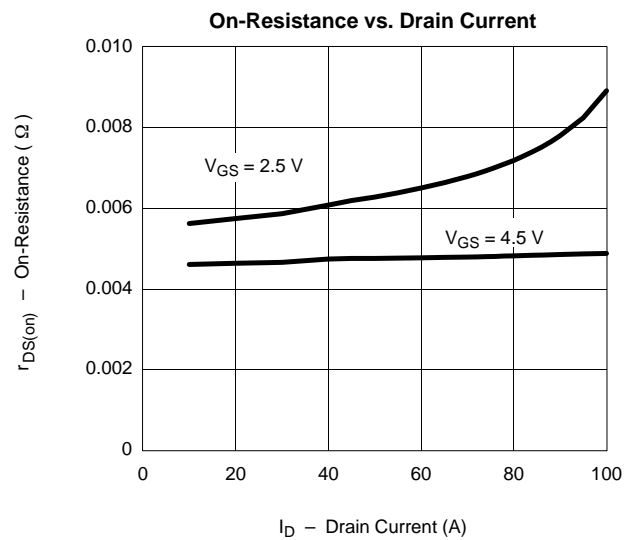
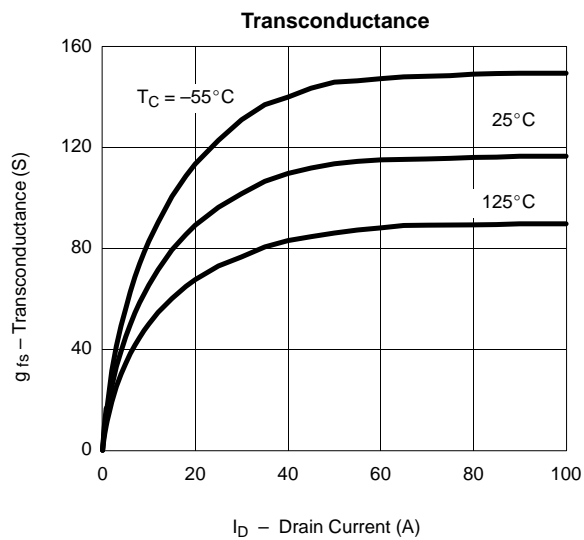
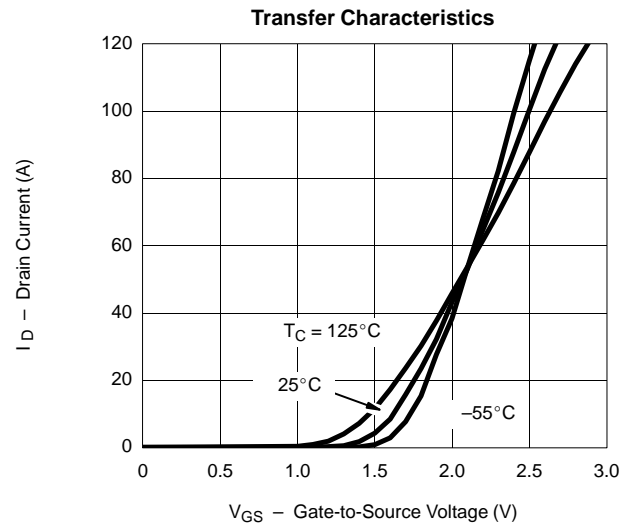
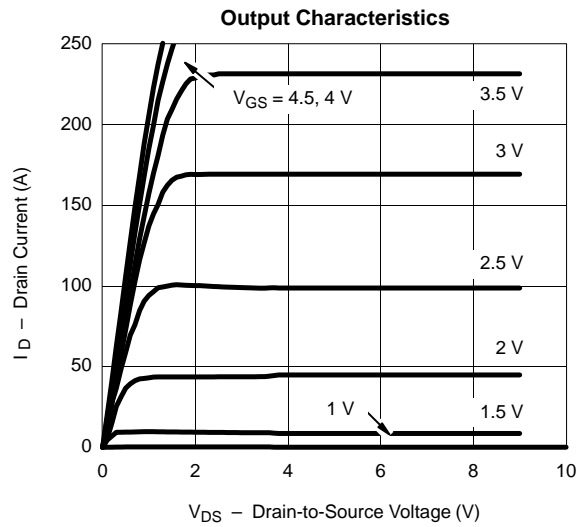
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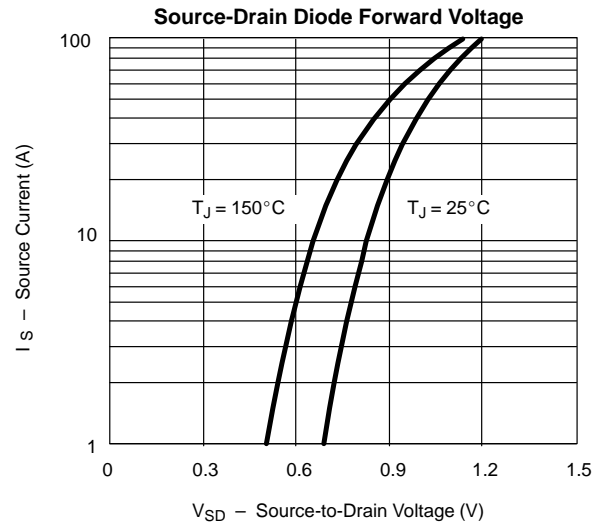
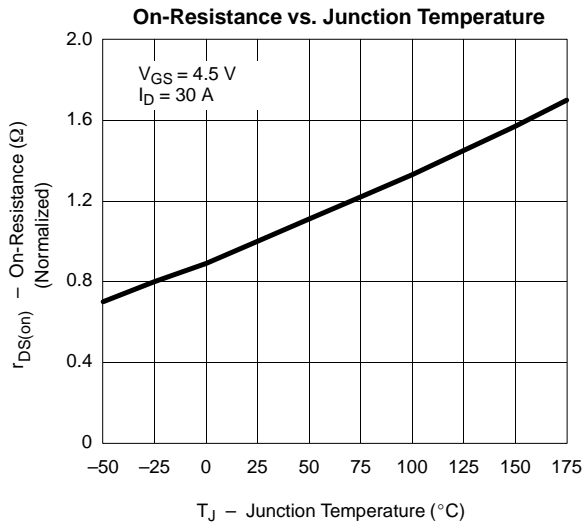
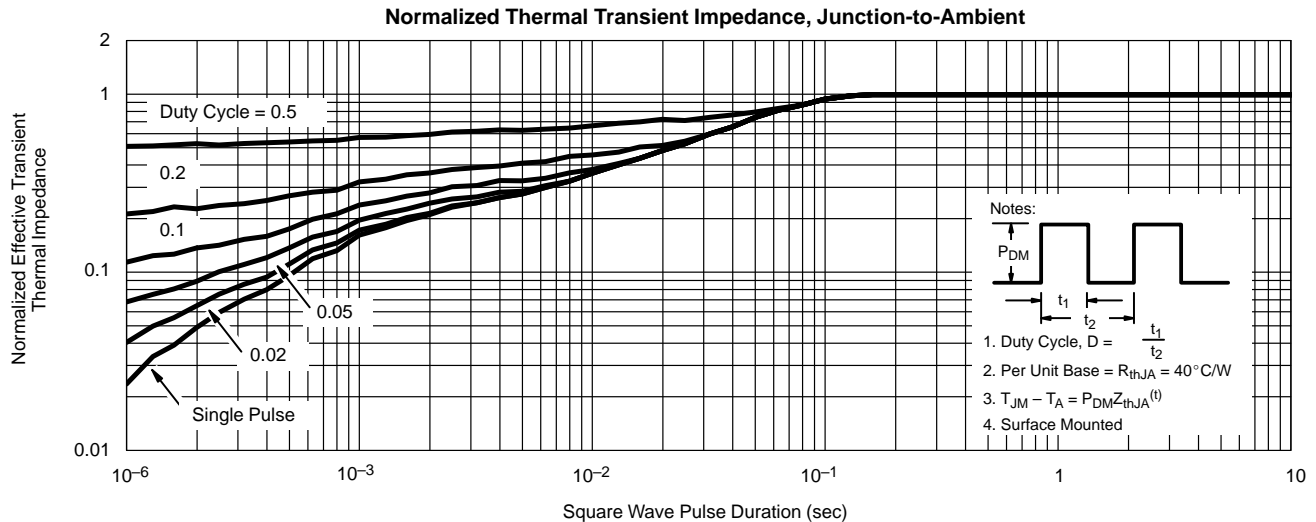
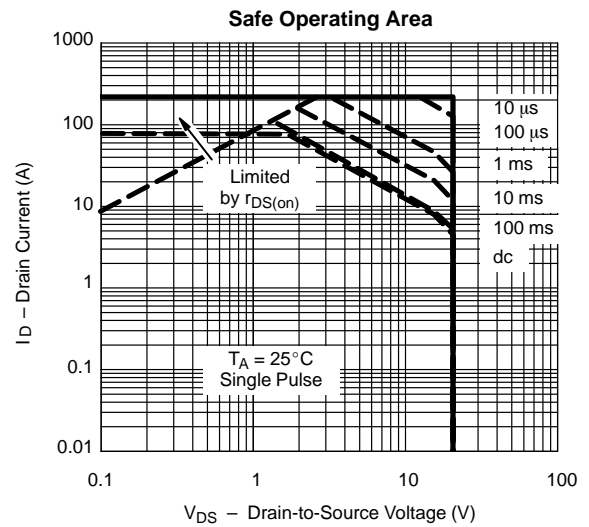
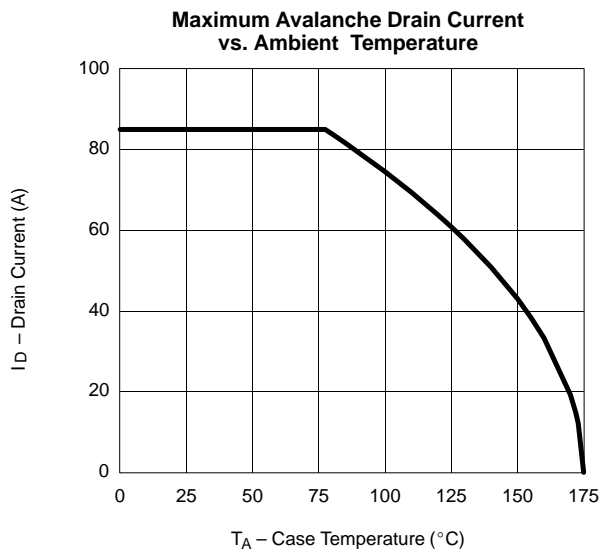
- See SOA curve for voltage derating.
- Duty cycle $\leq 1\%$.
- When mounted on 1" square PCB (FR-4 material).

MOSFET SPECIFICATIONS (T _J =25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	20			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _{DS} = 250 μA	0.5		1.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 125°C			50	
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 175°C			150	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 4.5 V	120			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 4.5 V, I _D = 30 A		0.004		Ω
		V _{GS} = 4.5 V, I _D = 30 A, T _J = 125°C		0.007		
		V _{GS} = 4.5 V, I _D = 30 A, T _J = 175°C		0.010		
		V _{GS} = 2.5 V, I _D = 20 A		0.005		
Forward Transconductance ^a	g _{fs}	V _{DS} = 5 V, I _D = 30 A	20			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz		6000		pF
Output Capacitance	C _{oss}			1100		
Reversen Transfer Capacitance	C _{rss}			600		
Total Gate Charge ^c	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 85 A		65	130	nC
Gate-Source Charge ^c	Q _{gs}			13		
Gate-Drain Charge ^c	Q _{gd}			14		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 10 V, R _L = 0.12 Ω I _D ≈ 85 A, V _{GEN} = 4.5 V, R _G = 2.5 Ω		25	40	ns
Rise Time ^c	t _r			120	180	
Turn-Off Delay Time ^c	t _{d(off)}			80	120	
Fall Time ^c	t _f			100	150	
Source-Drain Diode Ratings and Characteristics (T _C = 25 °C) ^b						
Pulsed Current	I _{SM}				240	A
Forward Voltage ^a	V _{SD}	I _F = 100 A, V _{GS} = 0 V		1.2	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs		45	100	ns

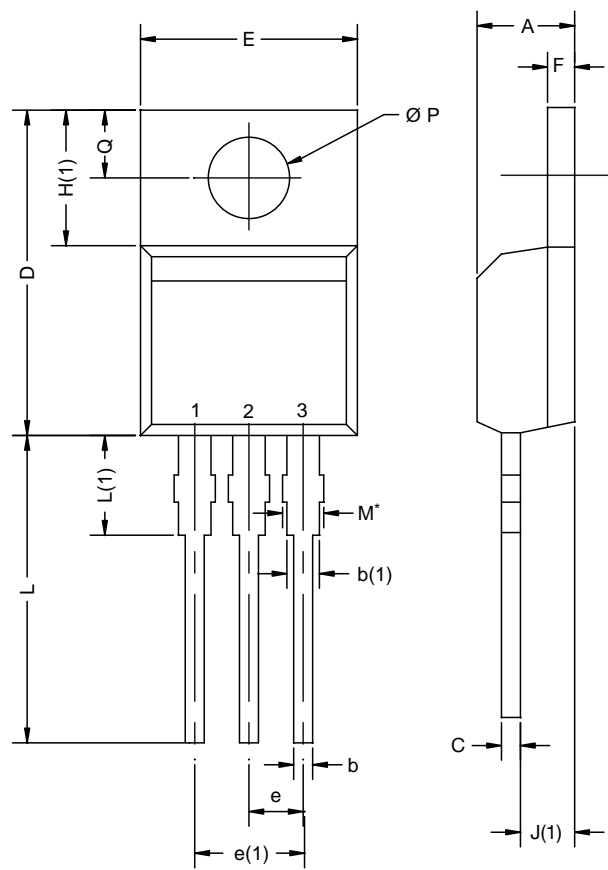
Notes:

- 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.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

THERMAL RATINGS


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
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: X12-0208-Rev. N, 08-Oct-12
DWG: 5471

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

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