

Description

The HSU90N03 is the high cell density trench N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

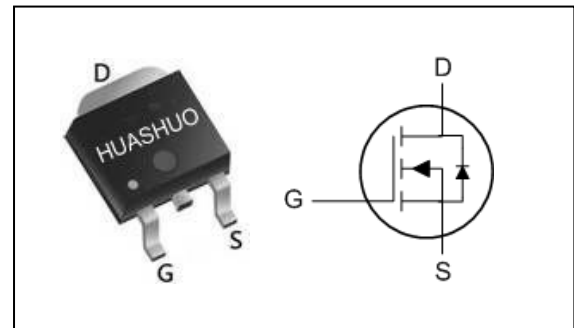
The HSU90N03 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

Product Summary

V_{DS}	30	V
$R_{DS(ON),typ}$	3.7	m Ω
I_D	90	A

TO-252 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V_1$	90	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V_1$	60	A
I_{DM}	Pulsed Drain Current ₂	320	A
EAS	Single Pulse Avalanche Energy ₃	300	mJ
I_{AS}	Avalanche Current	53.8	A
$P_D@T_A=25^\circ C$	Total Power Dissipation ₄	115	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ₁	---	50	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ₁	---	0.8	$^\circ C/W$



Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
B _{VDS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	---	---	V
ΔB _{VDS} /ΔT _J	B _{VDS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.021	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ₂	V _{GS} =10V, I _D =30A	---	3.7	4.5	mΩ
		V _{GS} =4.5V, I _D =15A	---	6.6	7.9	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0	1.5	3	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-5.73	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =24V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =24V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =15A	20	---	---	S
R _g	Gate Resistance	V _{DS} =10V, V _{GS} =0V, f=1MHz	---	1.8	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =30V, V _{GS} =10V, I _D =40A	---	80	---	nC
Q _{gs}	Gate-Source Charge		---	13	---	
Q _{gd}	Gate-Drain Charge		---	29	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =30V, V _{GS} =10V, R _G =3Ω I _D =40A	---	19	---	ns
T _r	Rise Time		---	14	---	
T _{d(off)}	Turn-Off Delay Time		---	51	---	
T _f	Fall Time		---	9	---	
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	2209	---	pF
C _{oss}	Output Capacitance		---	400	---	
C _{rss}	Reverse Transfer Capacitance		---	280	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current _{1,5}	V _G =V _D =0V, Force Current	---	---	90	A
I _{SM}	Pulsed Source Current _{2,5}		---	---	192	A
V _{SD}	Diode Forward Voltage ₂	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1	V
t _{rr}	Reverse Recovery Time	I _F =30A, di/dt=100A/μs,	---	32	---	nS
Q _{rr}	Reverse Recovery Charge	T _J =25°C	---	60	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch₂ FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=53.8A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

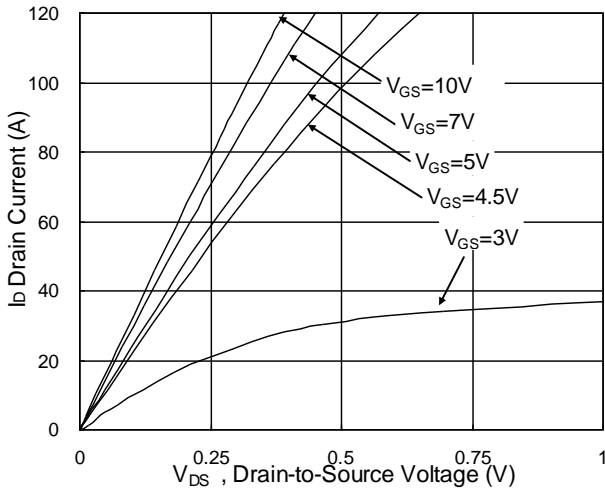


Fig.1 Typical Output Characteristics

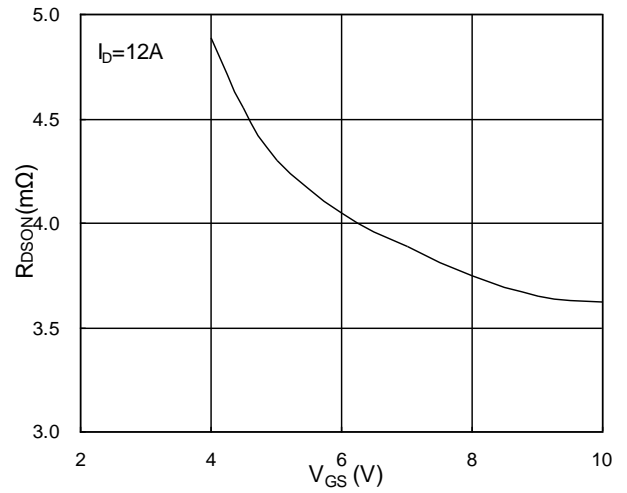


Fig.2 On-Resistance vs. G-S Voltage

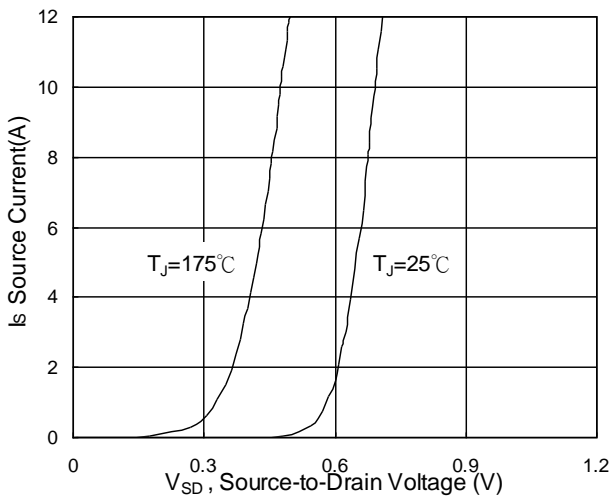


Fig.3 Forward Characteristics of Reverse

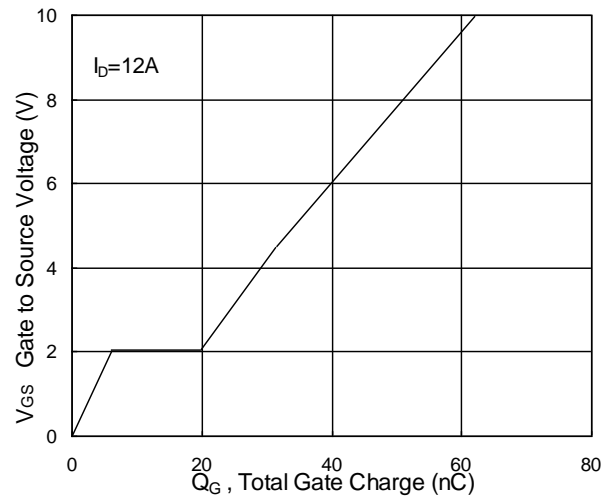


Fig.4 Gate-charge Characteristics

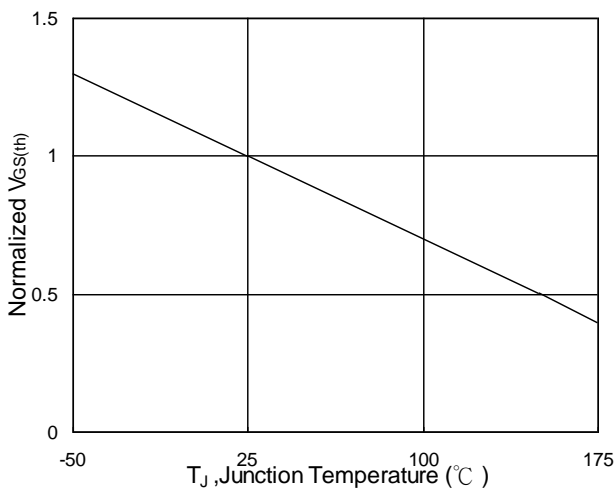


Fig.5 Normalized V_{GS(th)} vs. T_J

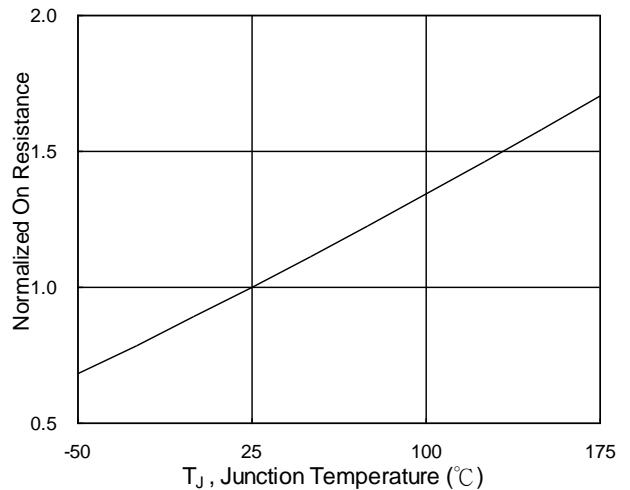


Fig.6 Normalized R_{DS(on)} vs. T_J

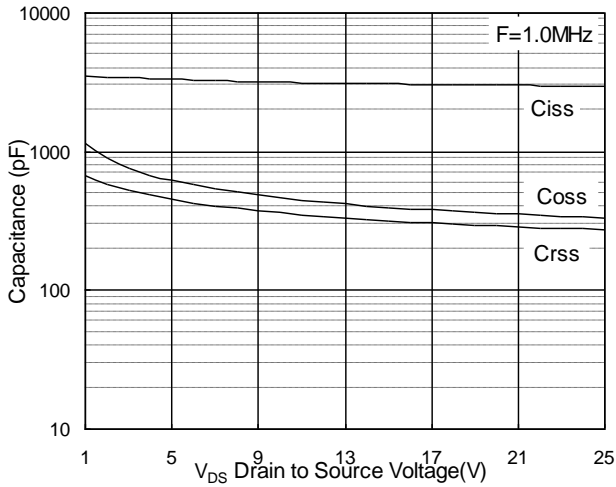


Fig.7 Capacitance

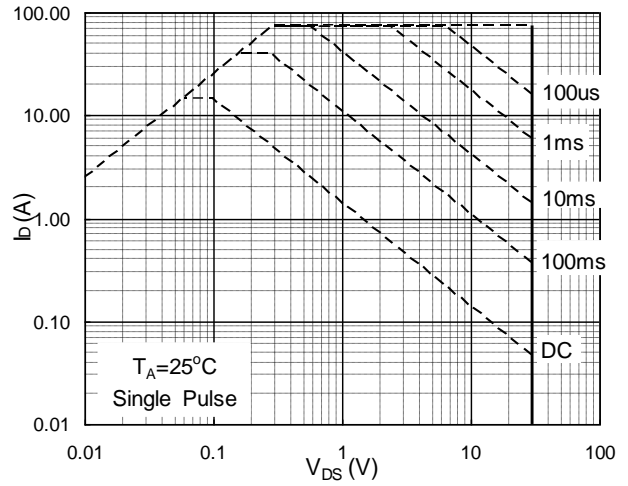


Fig.8 Safe Operating Area

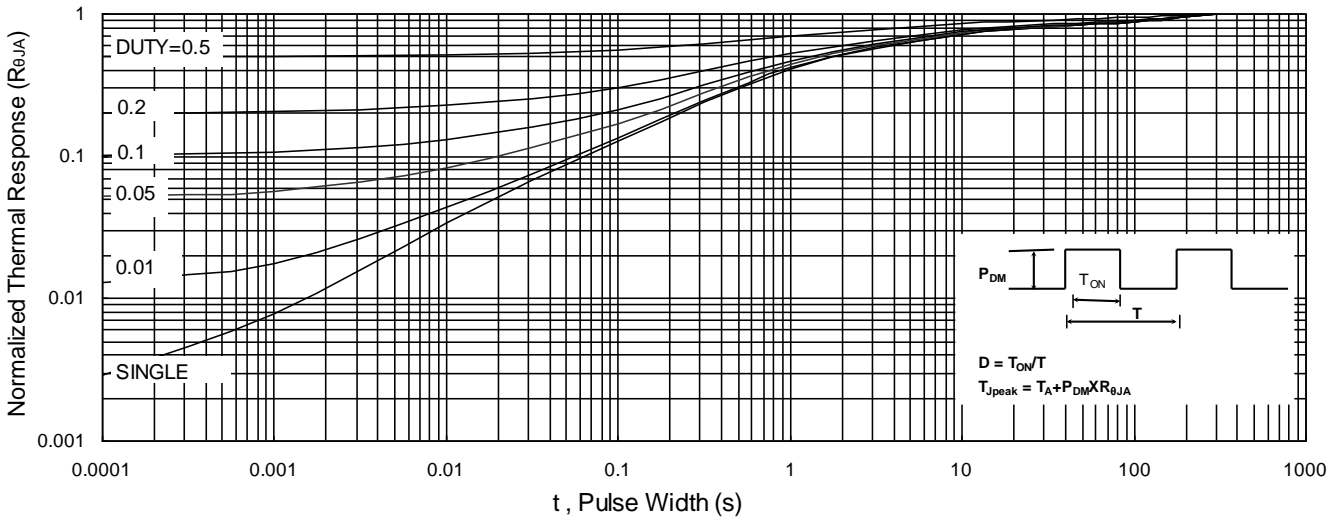


Fig.9 Normalized Maximum Transient Thermal Impedance

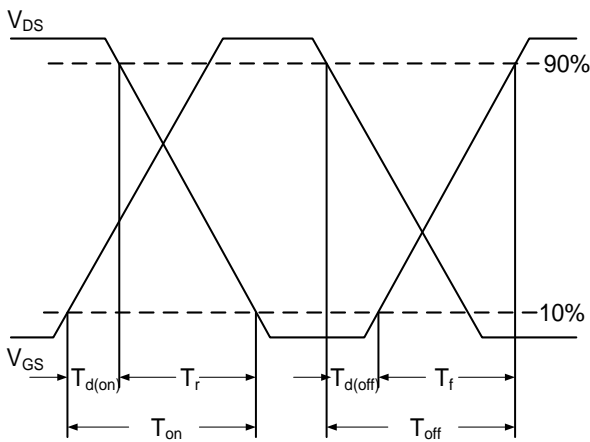


Fig.10 Switching Time Waveform

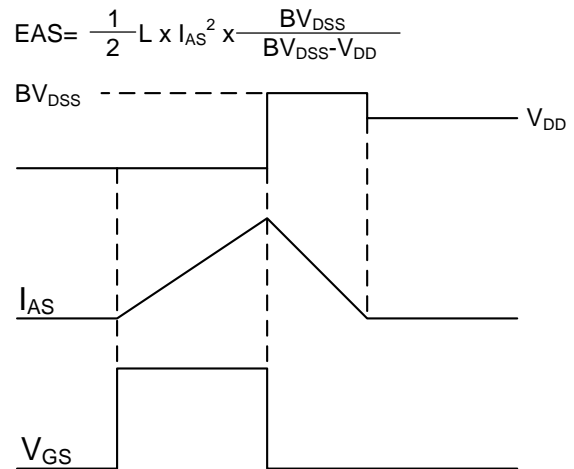
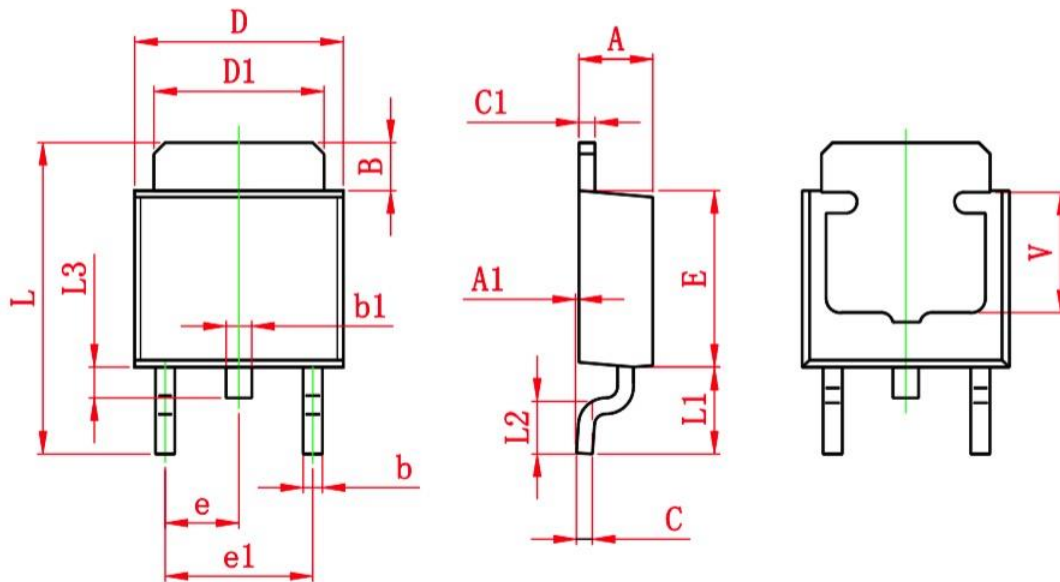


Fig.11 Unclamped Inductive Switching



Ordering Information

Part Number	Package code	Packaging
HSU90N03	TO252-2	2500/Tape&Reel



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	0.900	0.024	0.035
V	3.800 REF.		0.150 REF.	