

### General Description

The HSU90N12A uses SGT MOS technology to provide excellent  $R_{ds(on)}$ , low gate charge and fast switching characteristics. This device is suitable for use as a wide variety of applications.

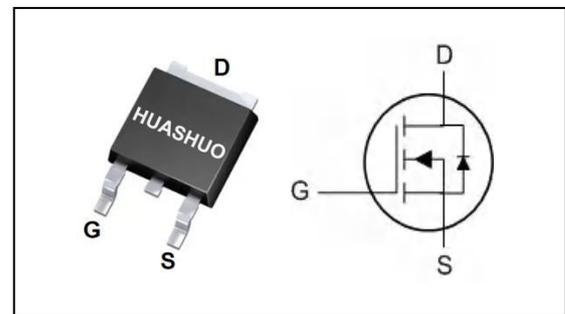
### Product Summary

$V_{DS}$	120	V
$R_{DS(ON),typ}$	7	m $\Omega$
$I_D$	90	A

### Features

- 100% EAS Guaranteed
- Low  $R_{DS(ON)}$
- Low Gate Charge
- RoHs and Halogen-Free Compliant

### TO-252 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	120	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current <sup>1,6</sup>	90	A
$I_D@T_C=100^\circ C$	Continuous Drain Current <sup>1,6</sup>	62	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	360	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	508	mJ
$I_{AS}$	Avalanche Current	44	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	110	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	55	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	1.1	$^\circ C/W$



**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	120	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	7	9	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2	3	4	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =120V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =120V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A	---	43	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	2	---	Ω
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =60V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	53	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	12	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	18	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =60V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω, I <sub>D</sub> =20A	---	10	---	ns
T <sub>r</sub>	Rise Time		---	45	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	30	---	
T <sub>f</sub>	Fall Time		---	11	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, f=1MHz	---	3320	---	pF
C <sub>oss</sub>	Output Capacitance		---	345	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	18	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,5,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	90	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =20A, di/dt=100A/μs,	---	89	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25°C	---	112	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ 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<sub>DD</sub>=50V,V<sub>GS</sub>=10V,L=0.5mH,I<sub>AS</sub>=44A
- 4.The power dissipation is limited by junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.
- 6.The maximum current rating is package limited.



### Typical Characteristics

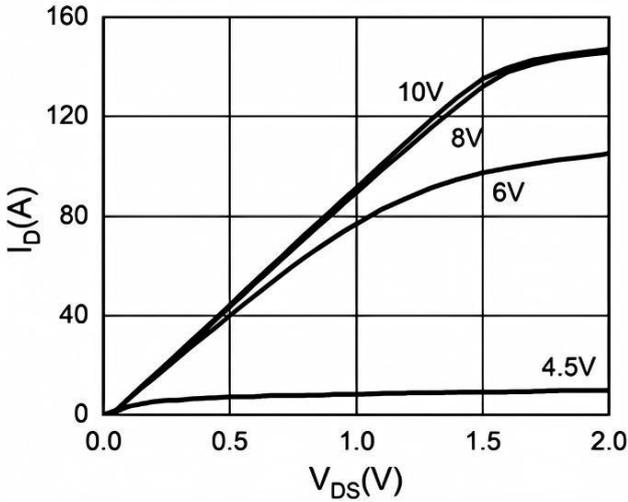


Fig.1 Typical Output Characteristics

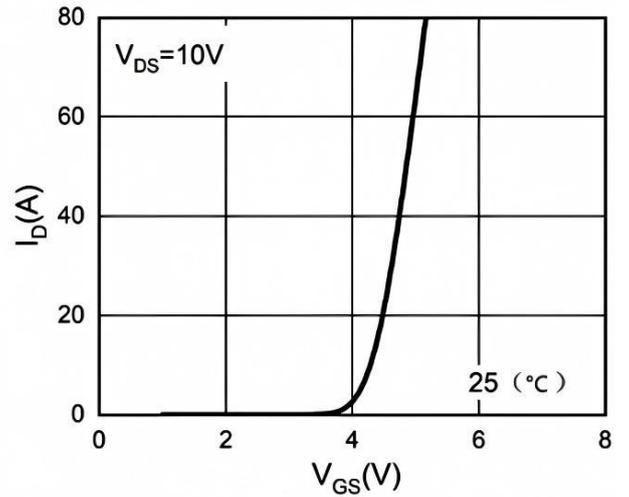


Fig.2 Transfer Characteristics

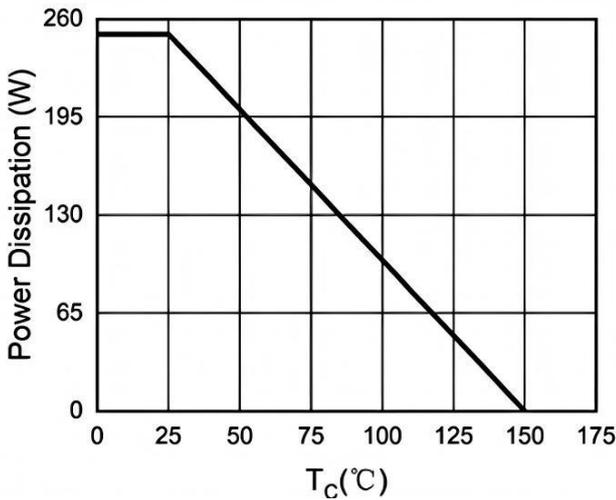


Fig.3 Power Dissipation

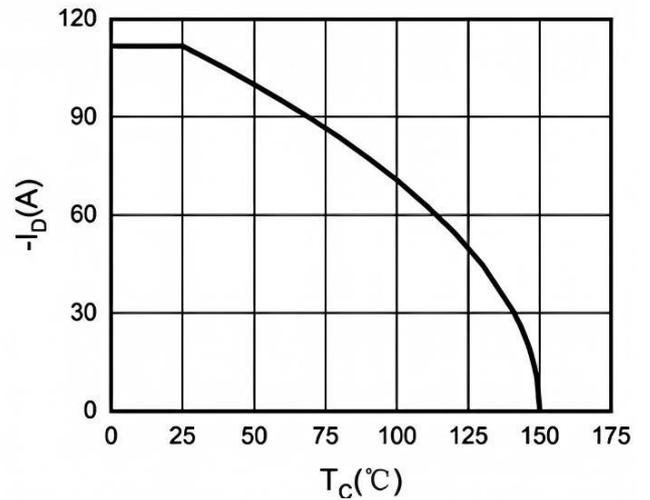


Fig.4 Drain Current

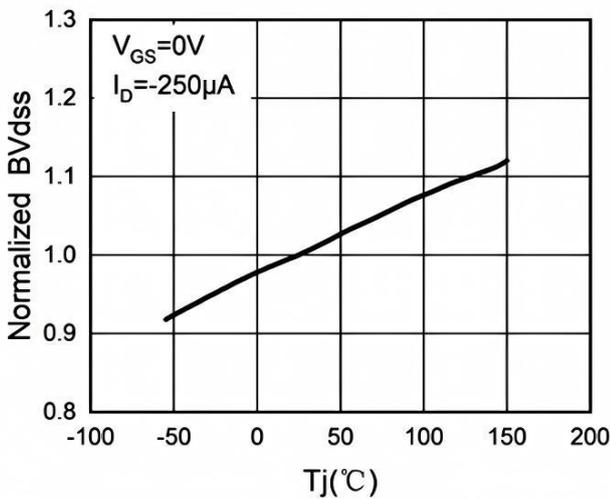


Fig.5  $BV_{DS}$  vs Junction Temperature

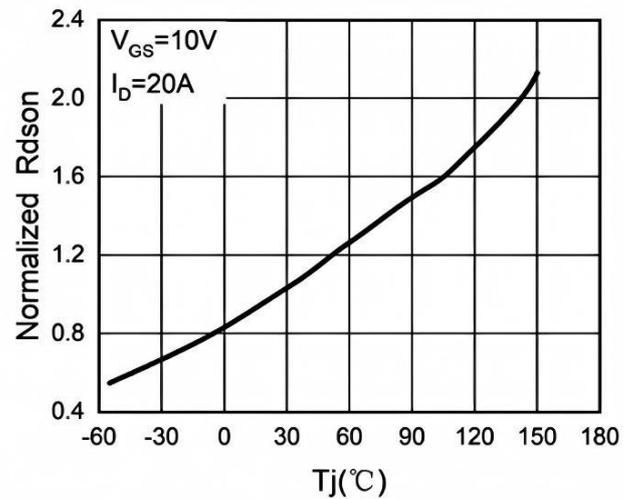


Fig.6  $R_{DS(ON)}$  vs Junction Temperature



## N-Ch 120V Fast Switching MOSFETs

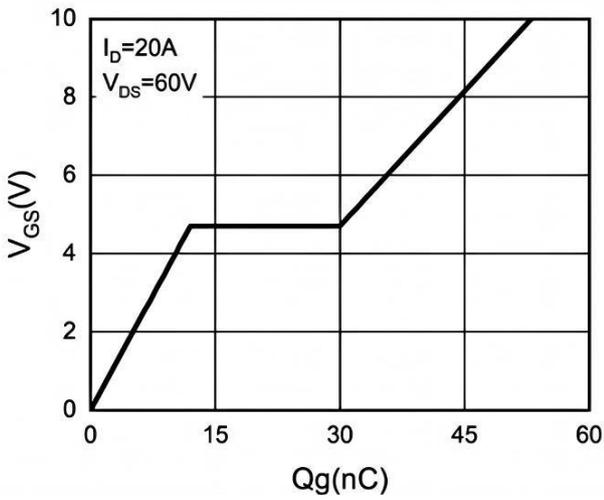


Fig.7 Gate Charge Waveforms

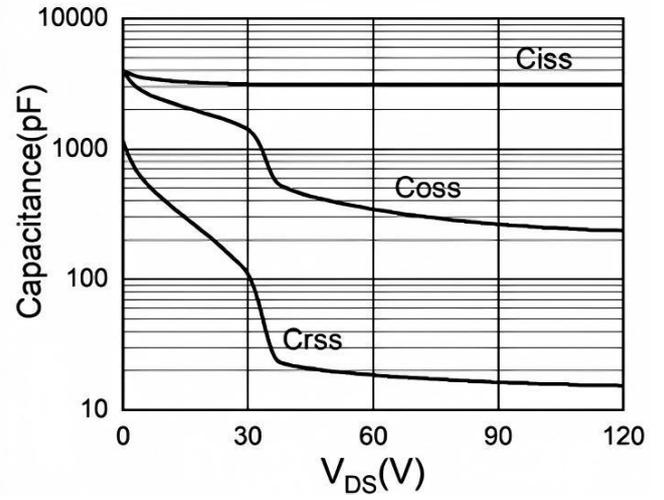


Fig.8 Capacitance

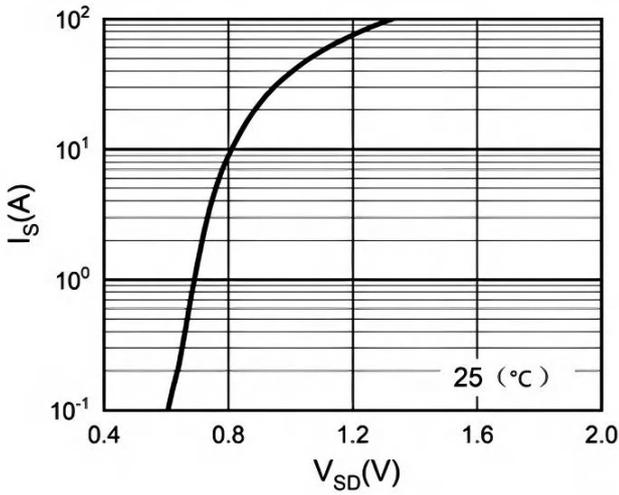


Fig.9 Body Diode Characteristics

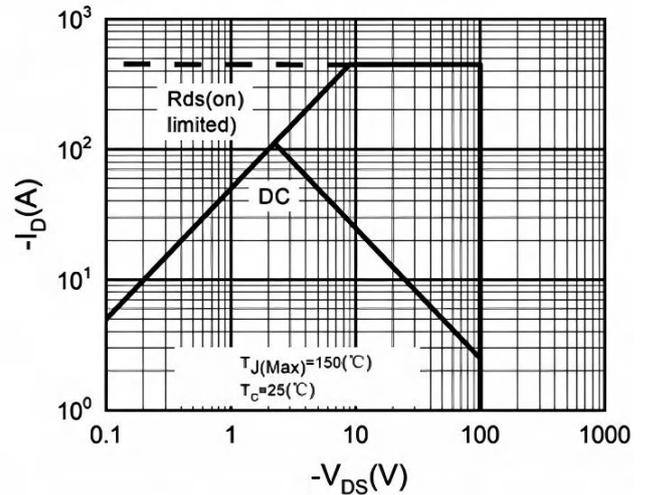


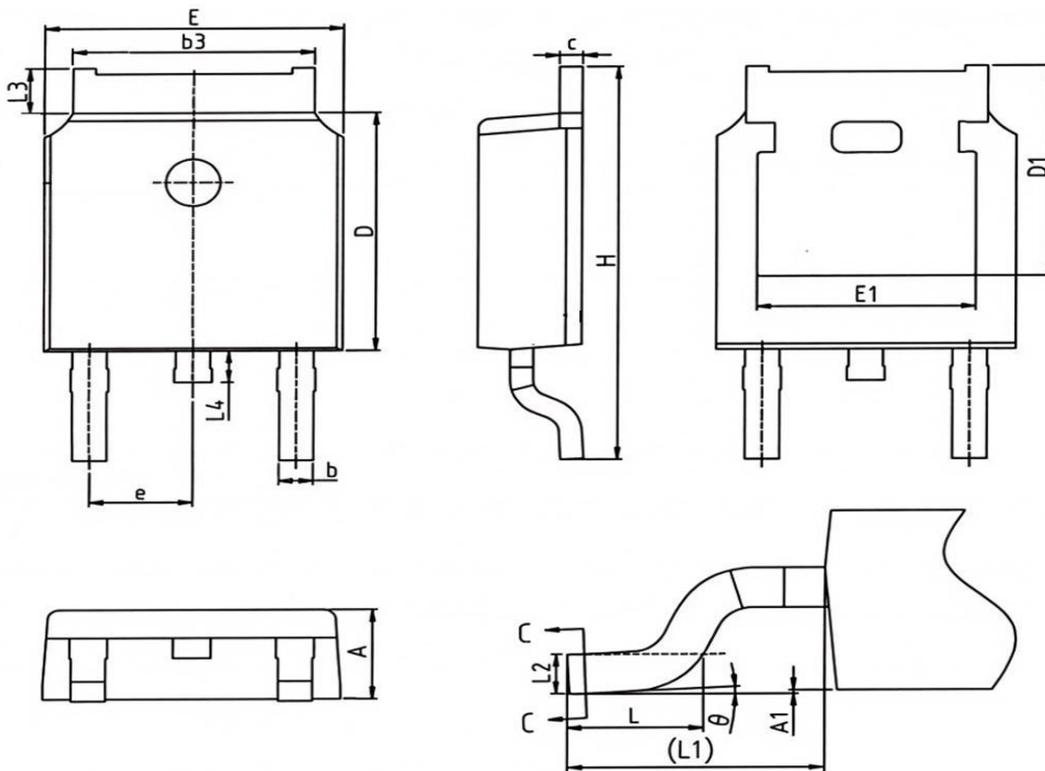
Fig.10 Maximum Safe Operating Area



## Ordering Information

Part Number	Package code	Packaging
HSU90N12A	TO-252	2500/Tape&Reel

### TO252 Package Outline



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.18	2.40	0.086	0.095
A1	-	0.2	-	0.008
b	0.68	0.9	0.026	0.036
b3	4.95	5.46	0.194	0.215
C	0.43	0.89	0.017	0.035
D	5.97	6.22	0.235	0.245
D1	5.300REF		0.209REF	
E	6.35	6.73	0.250	0.265
E1	4.32	---	0.170	-
e	2.286BSC		0.09BSC	
H	9.4	10.5	0.370	0.413
L	1.38	1.78	0.054	0.070
L1	2.90REF		0.114REF	
L2	0.51BSC		0.020BSC	
L3	0.88	1.28	0.034	0.050
L4	0.5	1	0.019	0.039
theta	0°	8°	0°	8°

## HSU90N12A Marking:

