

N-Ch 120V Fast Switching MOSFETs

Product Summary

General Description

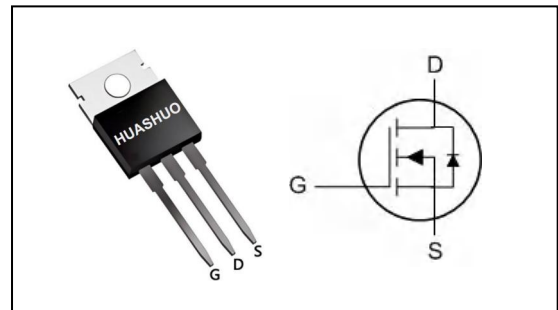
The HSP120N12A uses SGT technology to provide excellent $R_{DS(on)}$, low gate charge and fast switching characteristics. This device is suitable for use as a wide variety of applications.

V_{DS}	120	V
$R_{DS(ON),typ}$	7.3	m Ω
I_D	120	A

Features

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

TO-220 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	120	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current ^{1,6}	120	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current ^{1,6}	72	A
I_{DM}	Pulsed Drain Current ²	430	A
EAS	Single Pulse Avalanche Energy ³	508	mJ
I_{AS}	Avalanche Current	44	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	200	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	50	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.9	$^\circ\text{C/W}$



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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	120	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =20A	---	7.3	9.1	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	2	3	4	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =120V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =120V, 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 =20A	---	43	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2	---	Ω
Q _g	Total Gate Charge (10V)	V _{DS} =60V, V _{GS} =10V, I _D =20A	---	53	---	nC
Q _{gs}	Gate-Source Charge		---	12	---	
Q _{gd}	Gate-Drain Charge		---	18	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =60V, V _{GS} =10V, R _G =6Ω, I _D =20A	---	10	---	ns
T _r	Rise Time		---	45	---	
T _{d(off)}	Turn-Off Delay Time		---	30	---	
T _f	Fall Time		---	11	---	
C _{iss}	Input Capacitance	V _{DS} =60V, V _{GS} =0V, f=1MHz	---	3320	---	pF
C _{oss}	Output Capacitance		---	345	---	
C _{rss}	Reverse Transfer Capacitance		---	18	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,5,6}	V _G =V _D =0V, Force Current	---	---	120	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =20A, di/dt=100A/μs,	---	89	---	nS
Q _{rr}	Reverse Recovery Charge	T _J =25°C	---	112	---	nC

Note :

1.The data tested by surface mounted on a 1 inch² 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_{DD}=50V,V_{GS}=10V,L=0.5mH,I_{AS}=44A

4.The power dissipation is limited by 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.

6.The maximum current rating is package limited.



Typical Characteristics

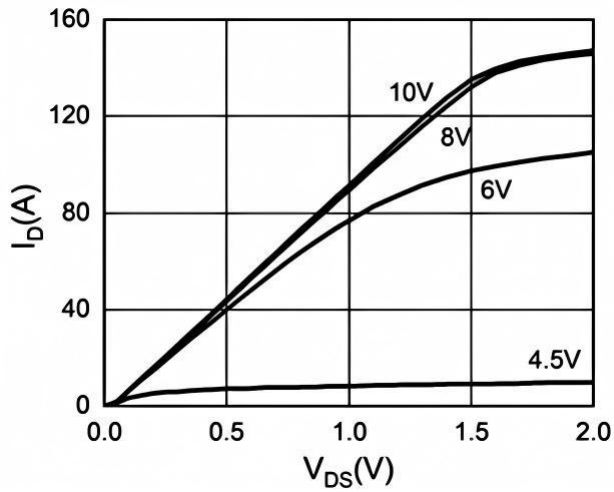


Fig.1 Typical Output Characteristics

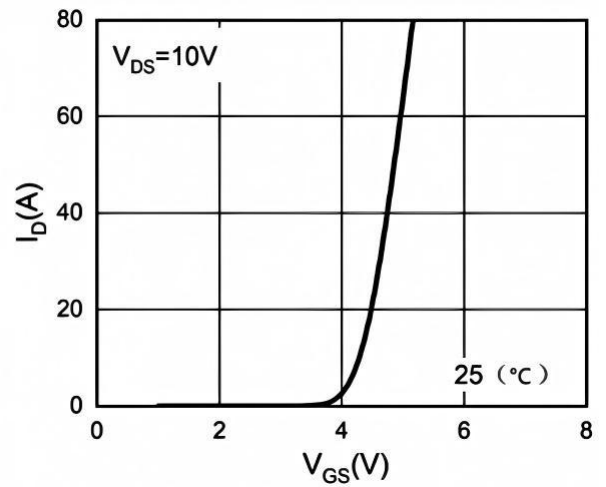


Fig.2 Transfer Characteristics

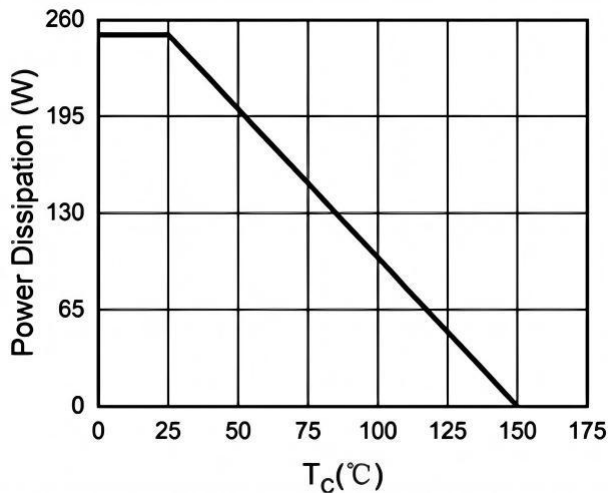


Fig.3 Power Dissipation

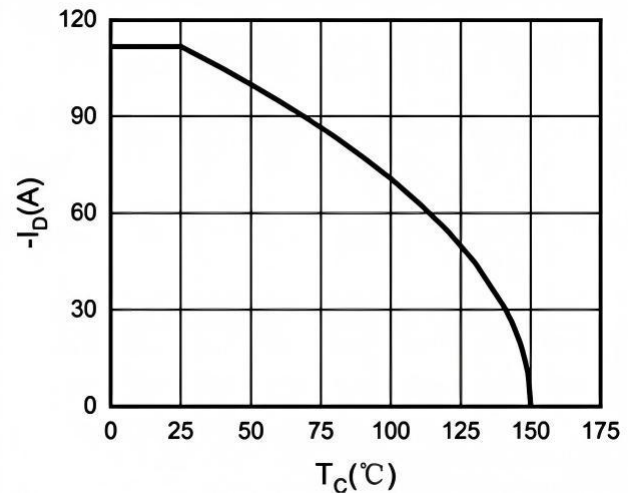


Fig.4 Drain Current

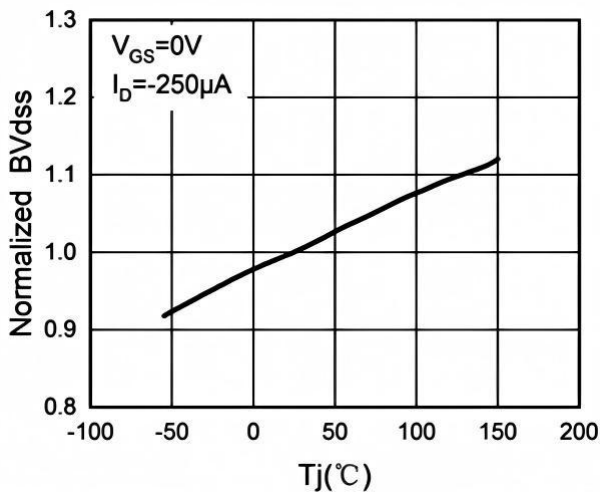


Fig.5 BV_DS vs Junction Temperature

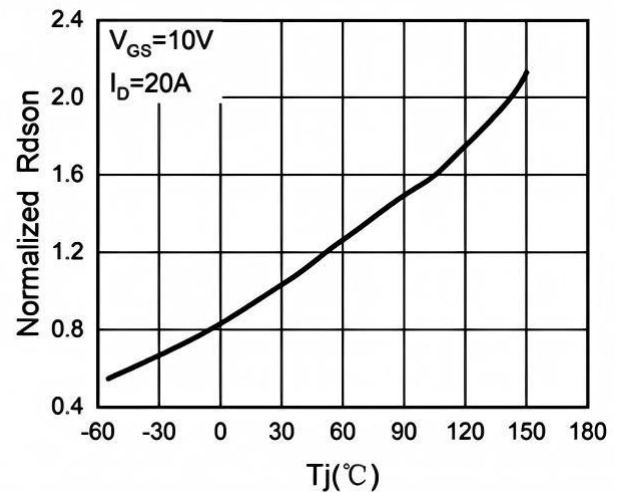


Fig.6 R_DS(ON) vs Junction Temperature



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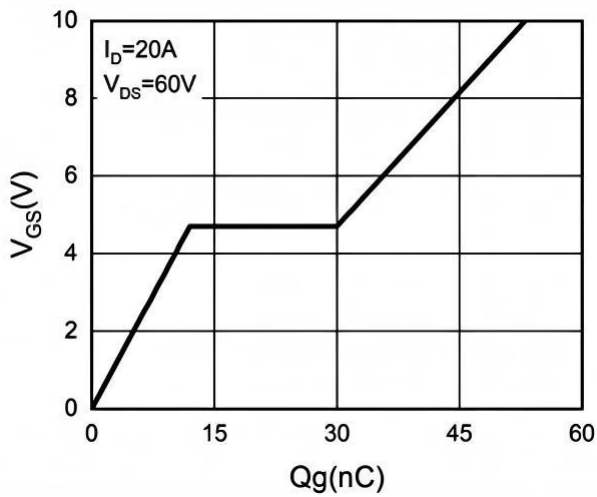


Fig.7 Gate Charge Waveforms

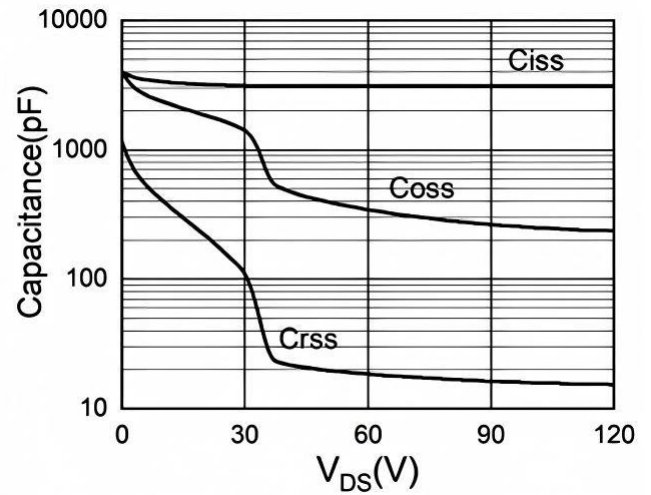


Fig.8 Capacitance

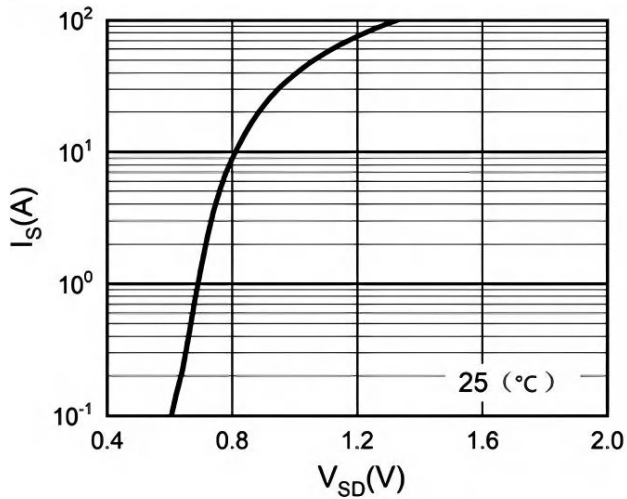


Fig.9 Body Diode Characteristics

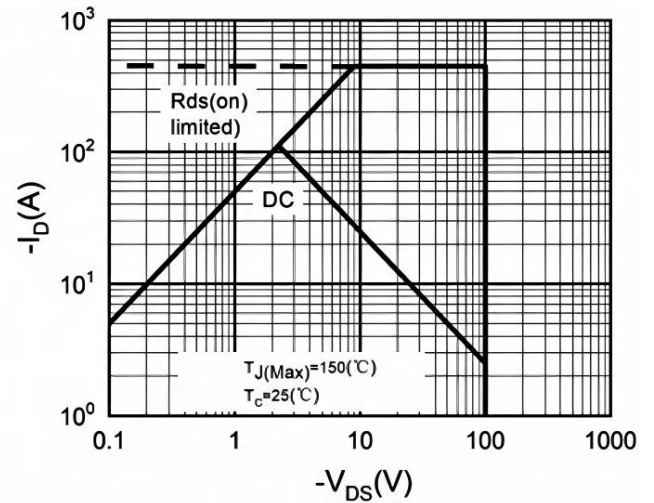
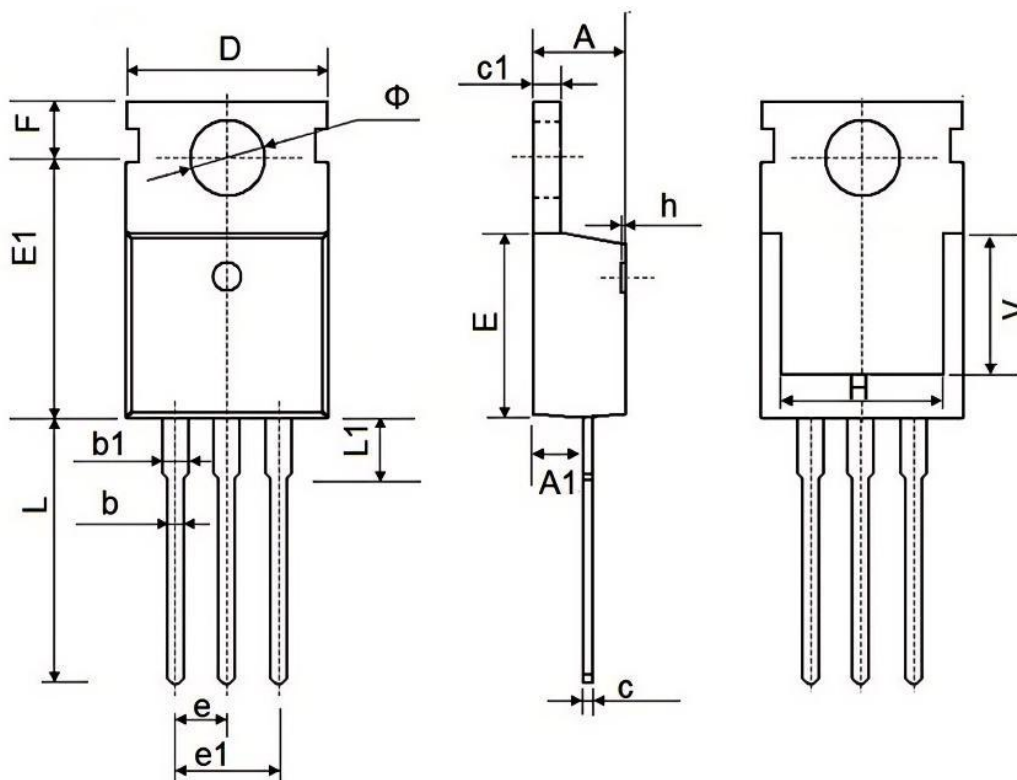


Fig.10 Maximum Safe Operating Area

Ordering Information

Part Number	Package code	Packaging
HSP120N12A	TO-220	1000/Box

TO-220 Package Outline



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	2.200	2.600	0.087	0.102
b	0.700	0.950	0.028	0.037
b1	1.170	1.410	0.046	0.056
C	0.450	0.650	0.018	0.026
c1	1.200	1.400	0.047	0.055
D	9.600	10.400	0.378	0.409
E	8.8500	9.750	0.348	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.750	14.300	0.502	0.563
L1	2.850	3.950	0.112	0.156
V	7.500 REF.		0.295 REF.	
Φ	3.400	4.000	0.134	0.157

HSP120N12A Marking:

