

General Description

The HSP18N20A is the highest performance SGT N-ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The HSP18N20A meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

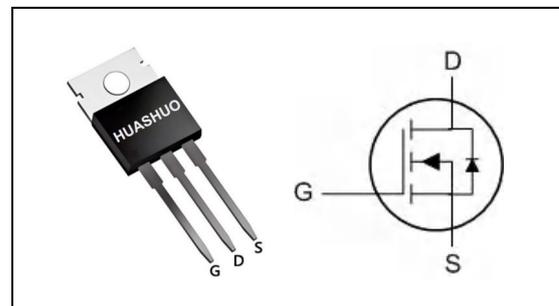
Features

- Super Low Gate Charge
- Green Device Available
- Excellent $C_{dv/dt}$ effect decline
- Advanced high cell density SGT MOS Technology

Product Summary

V_{DS}	200	V
$R_{DS(ON),typ}$	95	m Ω
I_D	18	A

TO-220 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	18	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	11	A
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	2.7	A
$I_D@T_A=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	2.2	A
I_{DM}	Pulsed Drain Current ²	36	A
EAS	Single Pulse Avalanche Energy ³	40	mJ
I_{AS}	Avalanche Current	28	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ³	85	W
$P_D@T_A=25^\circ C$	Total Power Dissipation ³	2	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 ¹	---	60	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	1.1	$^\circ C/W$



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	200	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =10A	---	95	120	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	2	2.9	3.5	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =160V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =160V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	0.9	---	Ω
Q _g	Total Gate Charge (10V)	V _{DS} =100V, V _{GS} =10V, I _D =10A	---	14	---	nC
Q _{gs}	Gate-Source Charge		---	3.9	---	
Q _{gd}	Gate-Drain Charge		---	3.5	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =100V, V _{GS} =10V, R _G =3.3Ω I _D =10A	---	8.3	---	ns
T _r	Rise Time		---	18.2	---	
T _{d(off)}	Turn-Off Delay Time		---	15	---	
T _f	Fall Time		---	3.8	---	
C _{iss}	Input Capacitance	V _{DS} =100V, V _{GS} =0V, f=1MHz	---	887	---	pF
C _{oss}	Output Capacitance		---	49	---	
C _{rss}	Reverse Transfer Capacitance		---	5.3	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	18	A
I _{SM}	Pulsed Source Current ^{2,5}		---	---	36	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 =10A, dI/dt=100A/μs, T _J =25°C	---	87	---	nS
Q _{rr}	Reverse Recovery Charge		---	303	---	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}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=28A
- 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.



Typical Characteristics

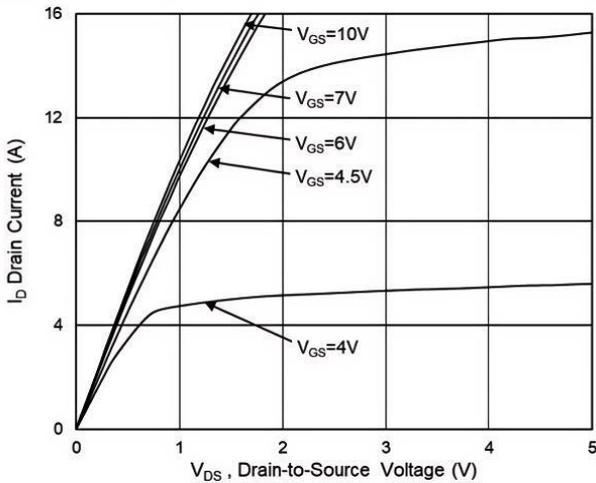


Fig.1 Typical Output Characteristics

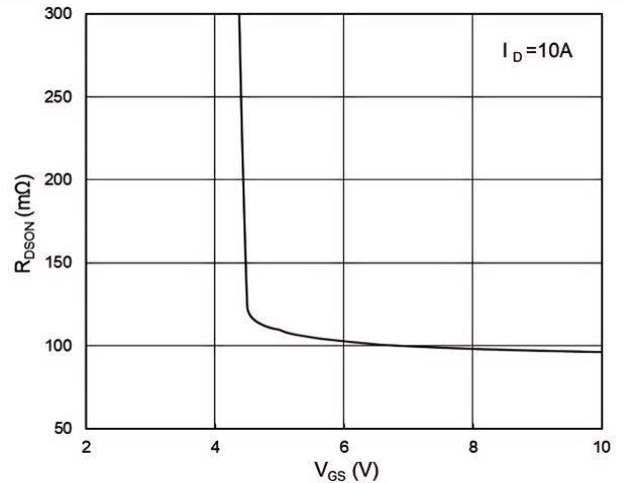


Fig.2 On-Resistance vs. Gate-Source

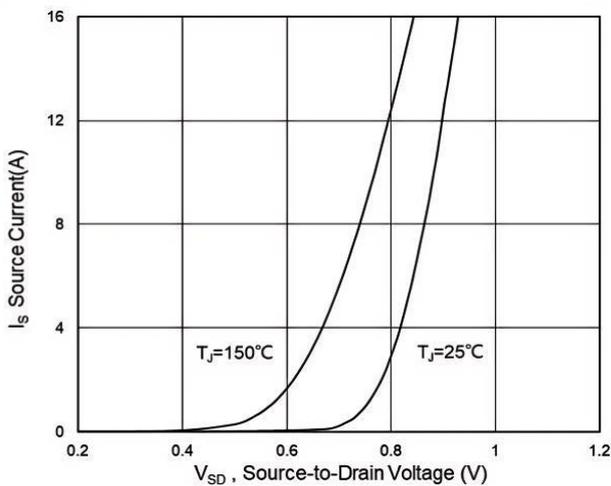


Fig.3 Forward Characteristics Of Reverse

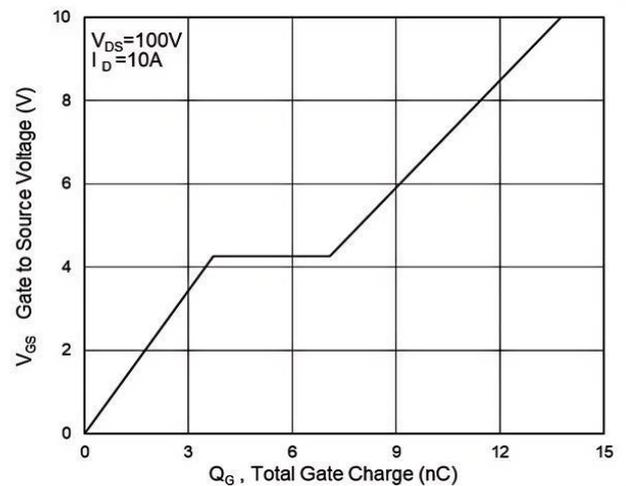


Fig.4 Gate-Charge Characteristics

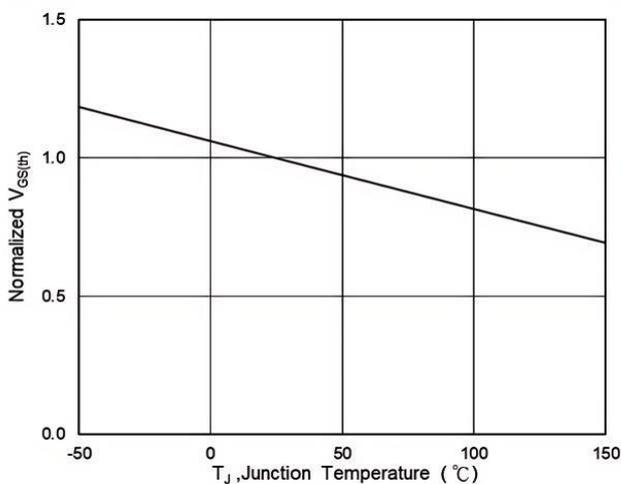


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

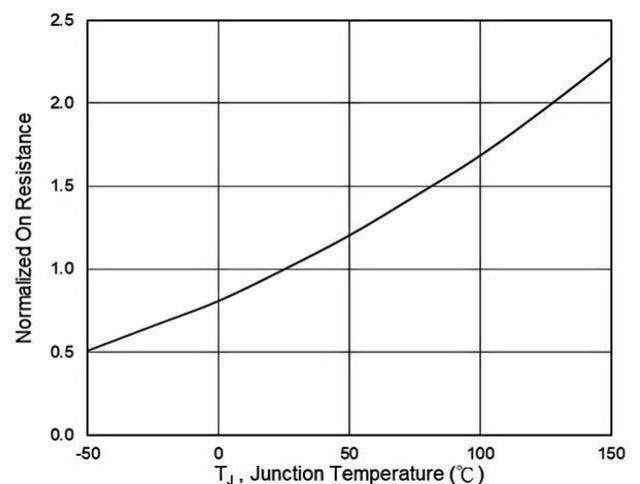


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



N-Ch 200V Fast Switching MOSFETs

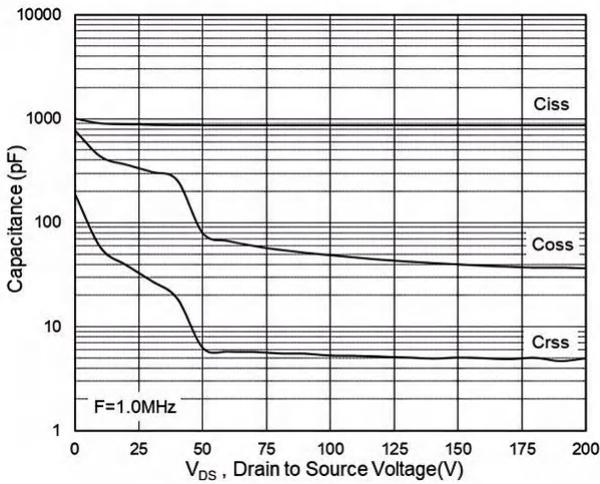


Fig.7 Capacitance

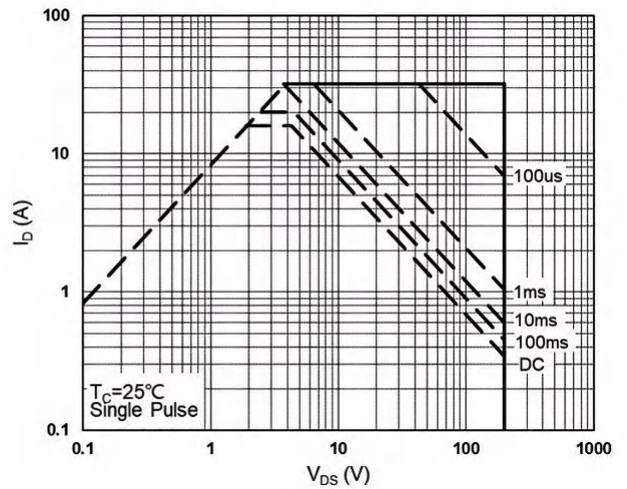


Fig.8 Safe Operating Area

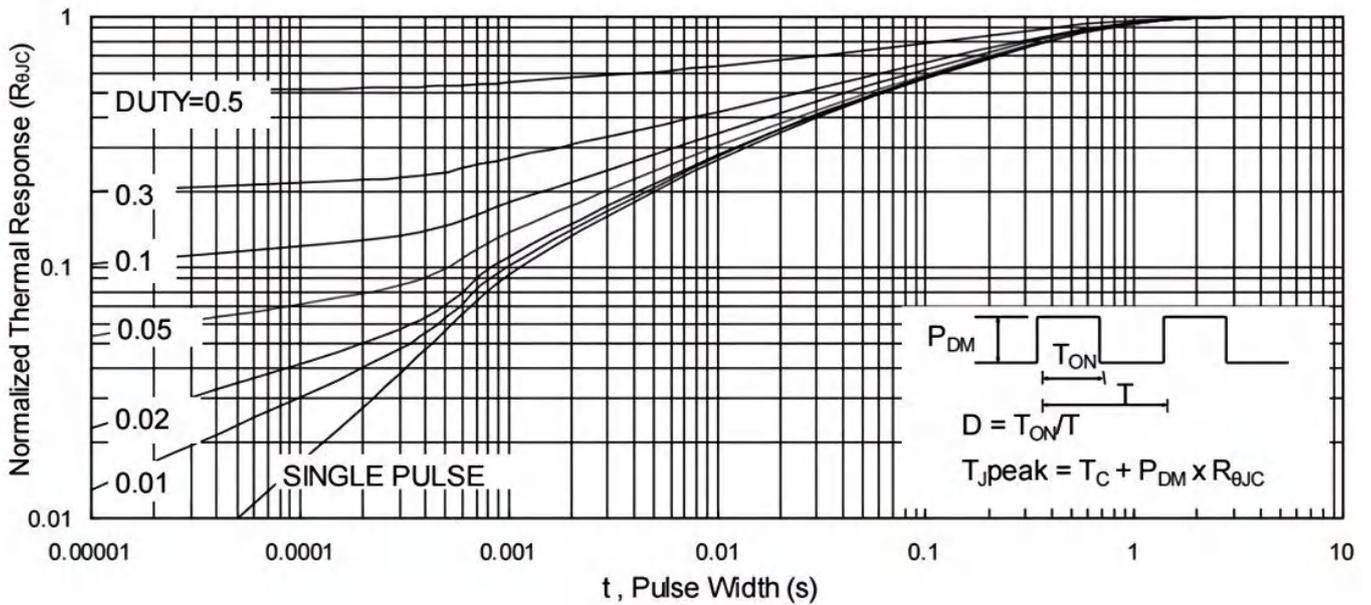


Fig.9 Normalized Maximum Transient Thermal Impedance

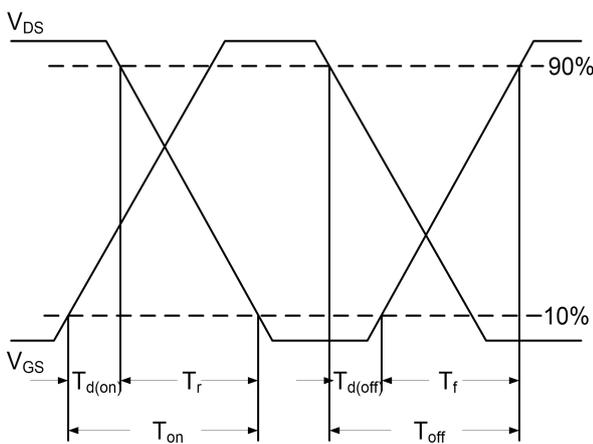


Fig.10 Switching Time Waveform

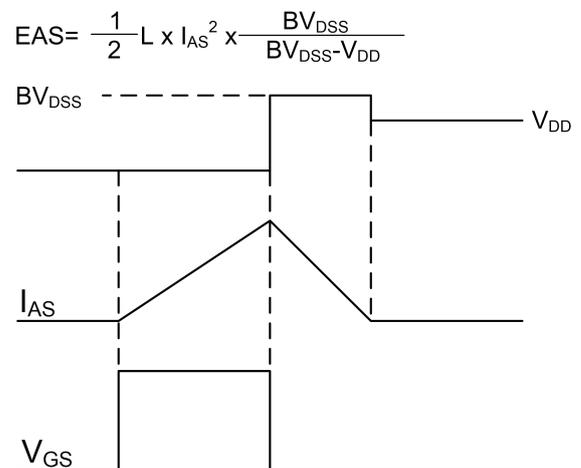


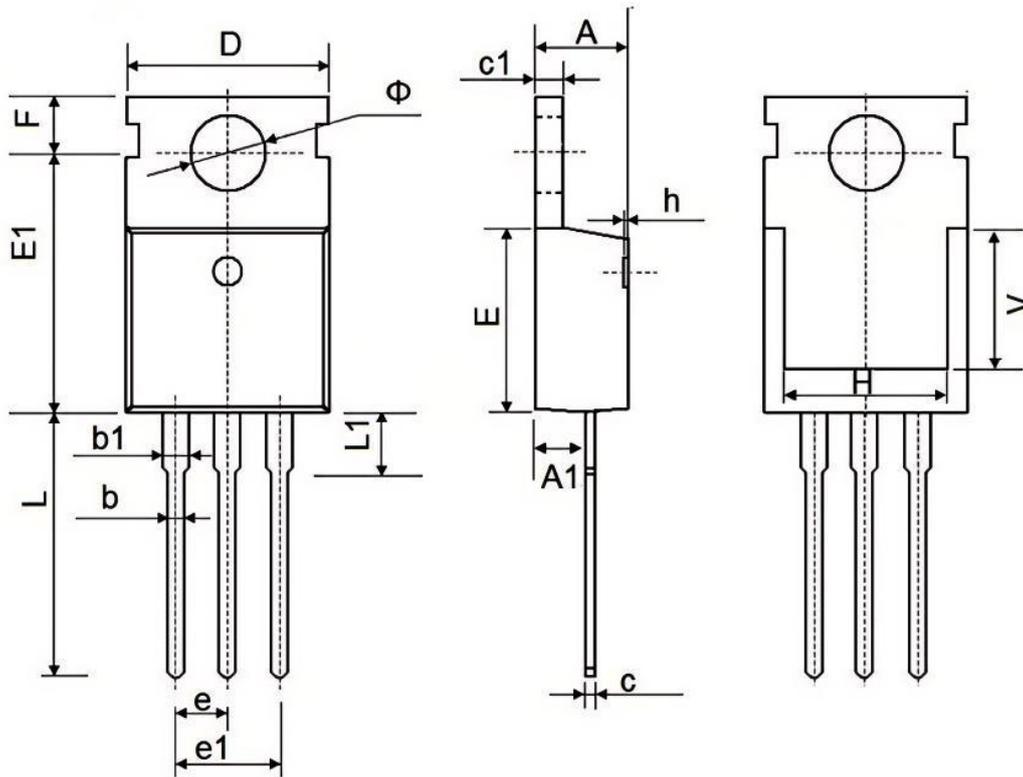
Fig.11 Unclamped Inductive Switching Waveform



Ordering Information

Part Number	Package code	Packaging
HSP18N20A	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



HSP18N20A Marking:

