HSX120N20

N-Ch 200V Fast Switching MOSFETs

General Description

The HSX120N20 is the highest performance SGT N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSX120N20 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

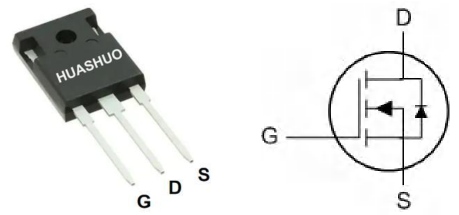
Product Summary

V_{DS}	200	V
$R_{DS(ON),typ}$	8.9	mΩ
I_D	120	A

Features

- Power Switching application
- Green Device Available
- Excellent Cdv/dt effect decline
- Advanced high cell density SGT MOS Technology

TO-247 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˚C	Continuous Drain Current, V_{GS} @ 10V[1]	120	A
I_D@T_C=100˚C	Continuous Drain Current, V_{GS} @ 10V[1]	92	A
I_{DM}	Pulsed Drain Current[2]	520	A
EAS	Single Pulse Avalanche Energy[3]	845	mJ
P_D@T_C=25˚C	Total Power Dissipation[3]	500	W
T_{STG}	Storage Temperature Range	-55 to 150	˚C
T_J	Operating Junction Temperature Range	-55 to 150	˚C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction-ambient [1]	---	40	˚C/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	---	0.36	˚C/W

Electrical Characteristics (T_J=25 ℃, 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=20A	---	8.9	11	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2.5	3.3	4.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=200V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=200V , V_{GS}=0V , T_J=55℃	---	---	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	---	5.0	---	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=100V , V_{GS}=10V , I_D=20A	---	46	---	nC
Q_{gs}	Gate-Source Charge		---	20	---	
Q_{gd}	Gate-Drain Charge		---	12	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=100V , V_{GS}=10V , R_G=2.5Ω I_D=20A	---	21	---	ns
T_r	Rise Time		---	22	---	
$T_{d(off)}$	Turn-Off Delay Time		---	32	---	
T_f	Fall Time		---	23	---	
C_{iss}	Input Capacitance	V_{DS}=50V , V_{GS}=0V , f=1MHz	---	3520	---	pF
C_{oss}	Output Capacitance		---	467	---	
C_{rss}	Reverse Transfer Capacitance		---	37	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	120	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=30A , T_J=25℃	---	---	1.2	V
Trr	Body Diode Reverse Recovery Time	IF = 15A, dIF/dt = 100A/s	---	133	---	ns
Qrr	Body Diode Reverse Recovery Charge	IF = 15A, dIF/dt = 100A/s	---	677	---	nC

Note :

1.The data tested by surface mounted on a 1 inch^2 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=0.5mH

4.The power dissipation is limited by 150℃ 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

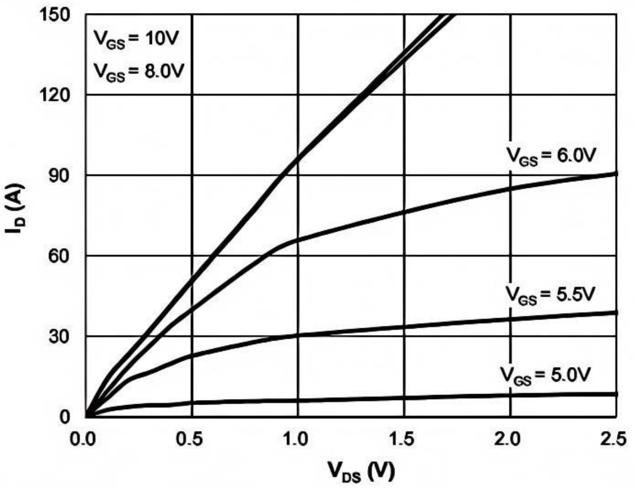


Figure 1: Saturation Characteristics

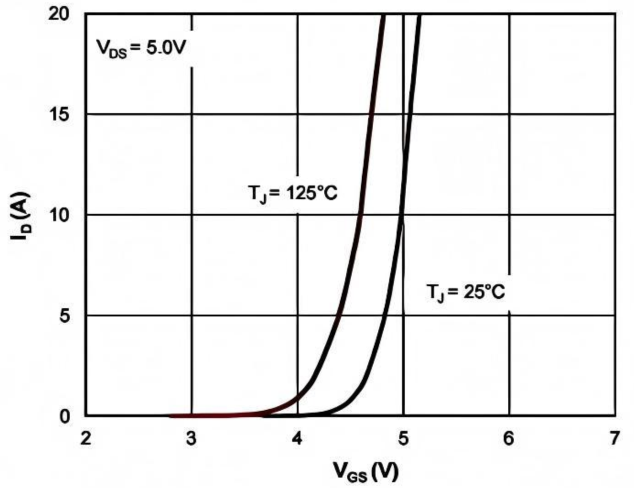


Figure 2: Transfer Characteristics

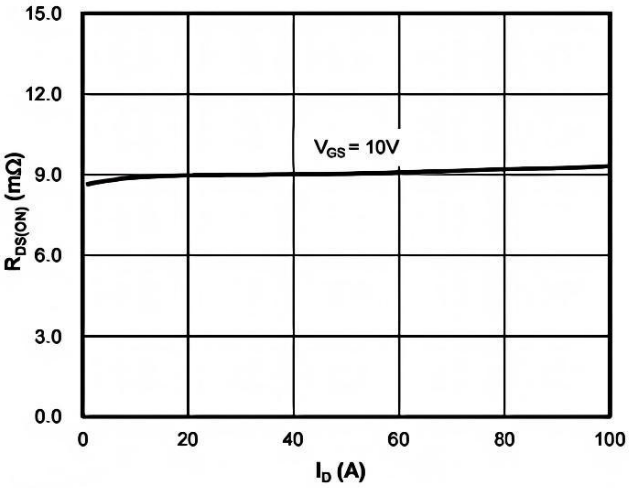


Figure 3: $R_{DS(ON)}$ vs. Drain Current

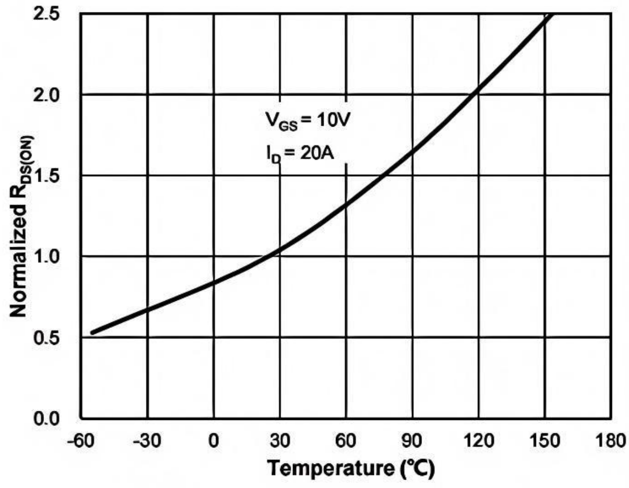


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

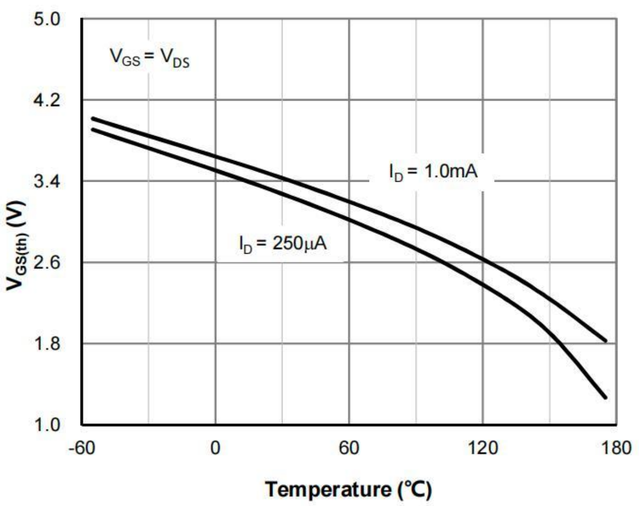


Figure 5: $V_{GS(th)}$ vs. Junction Temperature

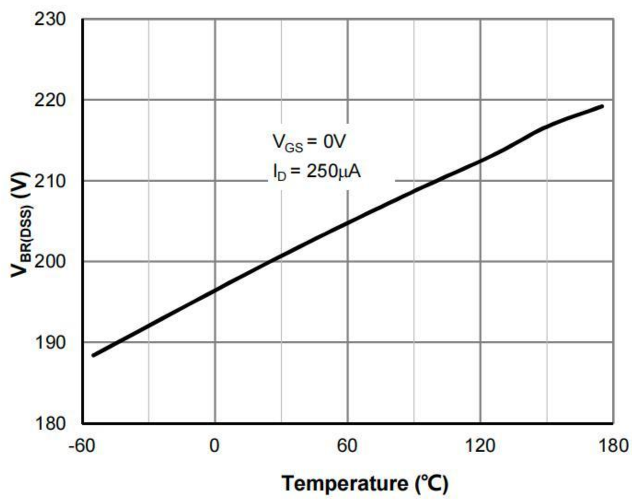


Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

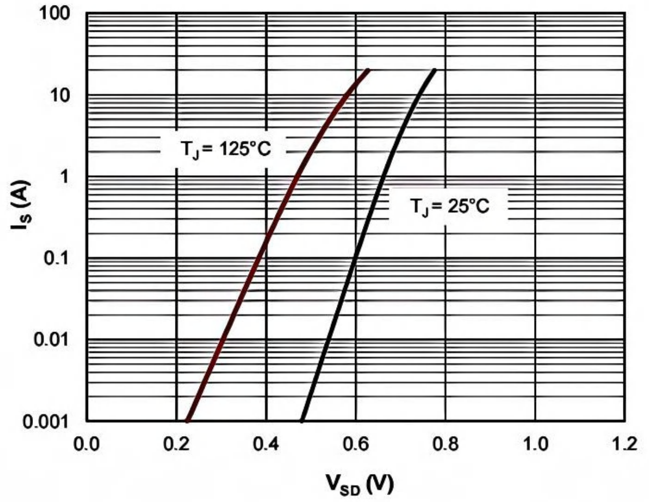


Figure 7: Body-Diode Characteristics

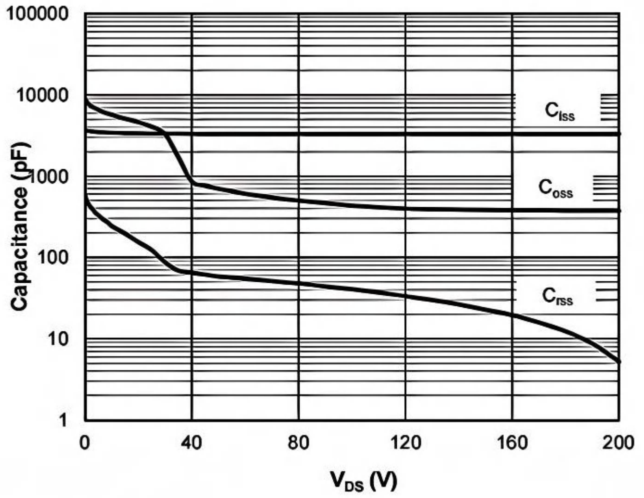


Figure 8: Capacitance Characteristics

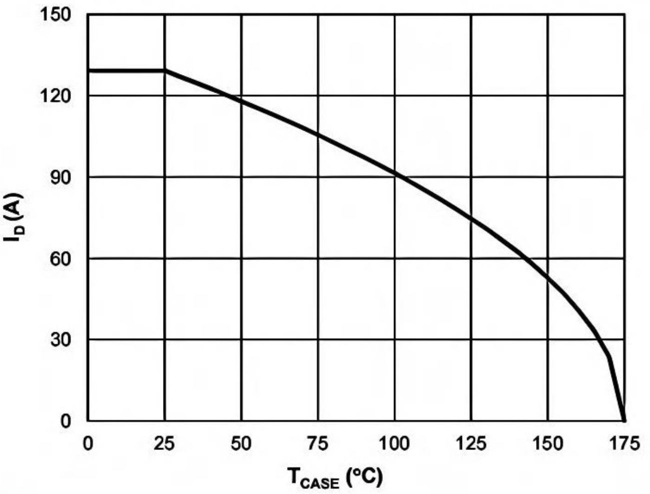


Figure 9: Current De-rating

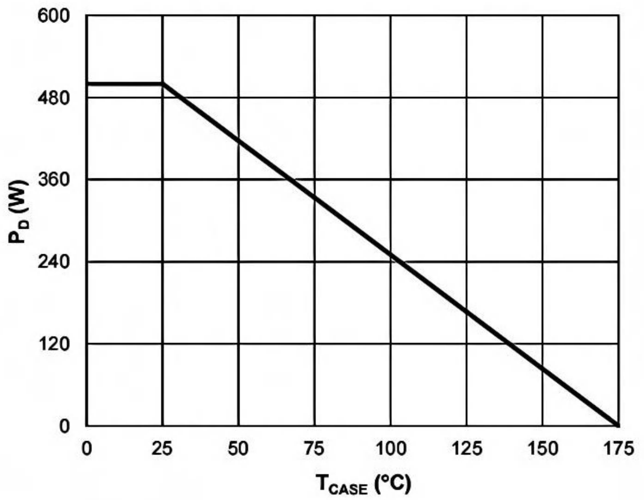


Figure 10: Power De-rating

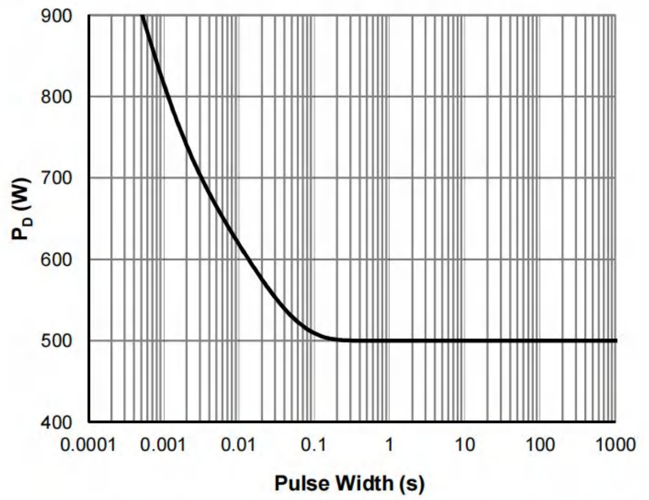


Figure 11: Single Pulse Power Rating, Junction-to-Case

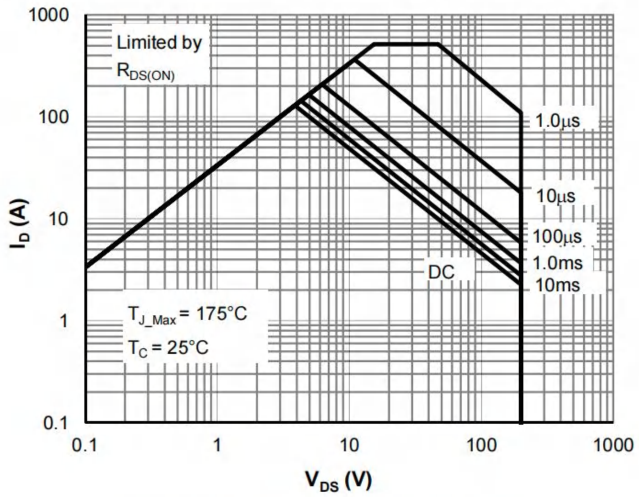


Figure 12: Maximum Safe Operating Area

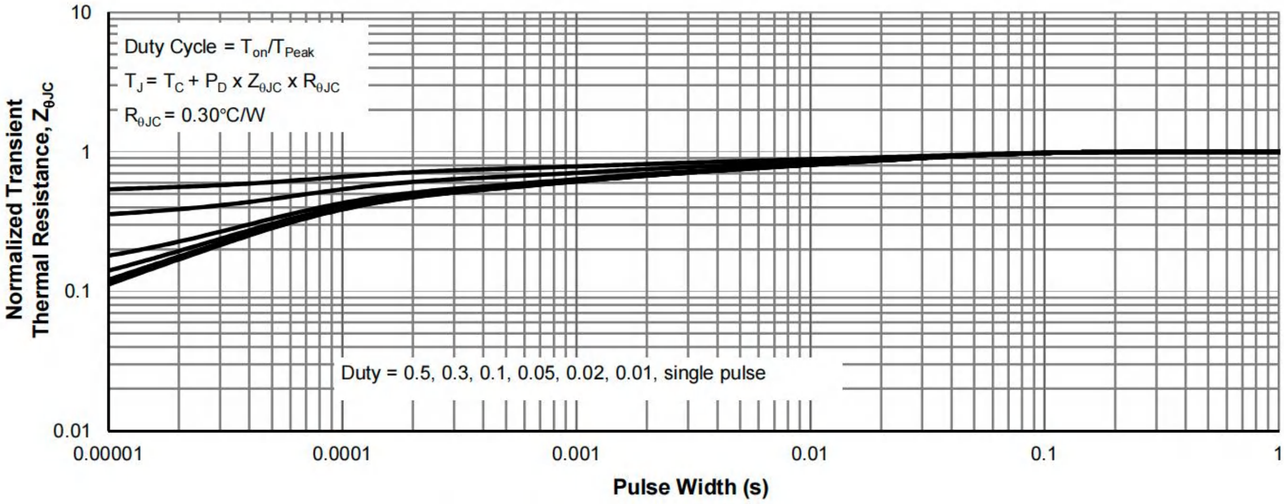
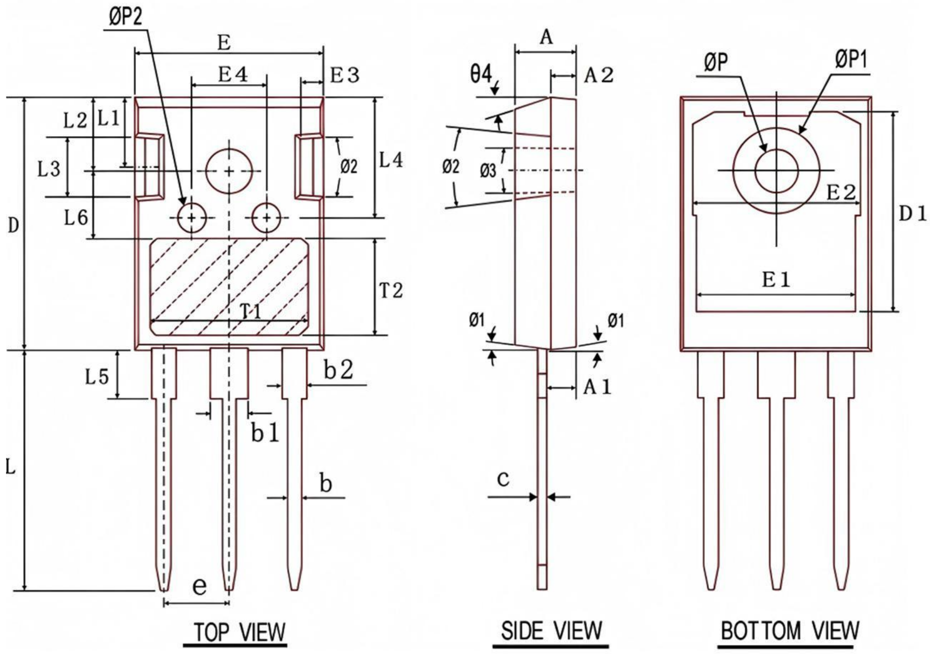


Figure 13: Normalized Maximum Transient Thermal Impedance

Ordering Information

Part Number	Package code	Packaging
HSX120N20	TO-247	/Box

TO-247 Package Outline



COMMON DIMENSIONSC OF MEASURE=MM			
SYMBOL	MIN	NOM	MAX
A	4.8	5	5.2
A 1	2.2	2.4	2.6
A 2	1.85	2	2.15
b	1.1	1.2	1.3
b 1	2.8	3	3.2
b 2	1.8	2	2.2
C	0.52	0.62	0.72
D	20.35	20.65	20.95
D 1	16.35	16.55	16.75
E	15.5	15.8	16.1
E 1	13.1	13.3	13.5
E2	13.8	14	14.2
E3	1.45	1.6	1.75
E4	6	6.2	6.4
L	19.8	20	20.2
L 1	5.88	5.98	6.08
L2	5.88	5.98	6.08
L3	4.9	5	5.1
L4	9.7	9.8	9.9
L5	4.1	4.3	4.5
Ø1	4 °	7 °	10 °
Ø2	11 °	14 °	17 °
Ø3	1 °	--	2 °
Ø4	10 °	15 °	20 °
ØP	3.35	3.6	3.85
ØP1	–	--	7.3
ØP2	2.25	2.5	2.75
e	5.44BSC		
T 1	12.80REF		
T2	7.80REF		
L6	5.50REF		

HSX120N20 Marking: