

N-Ch 200V Fast Switching MOSFETs Product Summary

General Description

The HSP200N02 is the highest performance trench 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.

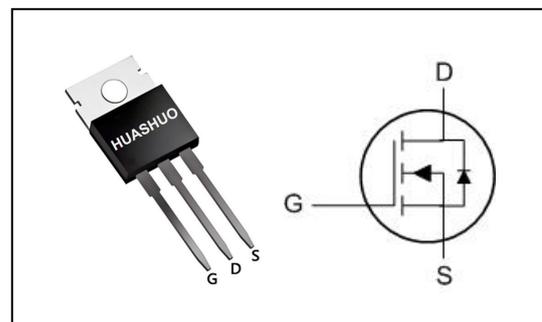
The HSP200N02 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

V _{DS}	200	V
R _{DS(ON),typ}	27	mΩ
I _D	70	A

Features

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

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°C	Continuous Drain Current, V _{GS} @ 10V ¹	70	A
I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ 10V ¹	46	A
I _{DM}	Pulsed Drain Current ²	252	A
EAS	Single Pulse Avalanche Energy ³	580	mJ
P _D @T _C =25°C	Total Power Dissipation ³	200	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	---	60	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	---	0.55	°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 =30A	---	27	33	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} =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	---	3	---	Ω
Q _g	Total Gate Charge (10V)	V _{DS} =100V, V _{GS} =10V, I _D =30A	---	110	---	nC
Q _{gs}	Gate-Source Charge		---	32	---	
Q _{gd}	Gate-Drain Charge		---	38	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =100V, V _{GS} =10V, R _G =2.5Ω I _D =30A	---	30	---	ns
T _r	Rise Time		---	18	---	
T _{d(off)}	Turn-Off Delay Time		---	22	---	
T _f	Fall Time		---	33	---	
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	5082	---	pF
C _{oss}	Output Capacitance		---	343	---	
C _{rss}	Reverse Transfer Capacitance		---	129	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	70	A
I _{SM}	Pulsed Source Current ^{2,5}		---	---	252	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =30A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =30A, dI/dt=100A/μs, T _J =25°C	---	47	---	nS
Q _{rr}	Reverse Recovery Charge		---	81	---	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=0.3mH
- 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

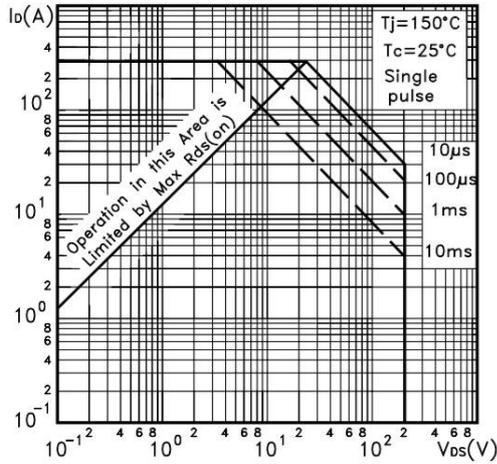


Fig.1 Safe operating area for TO-220

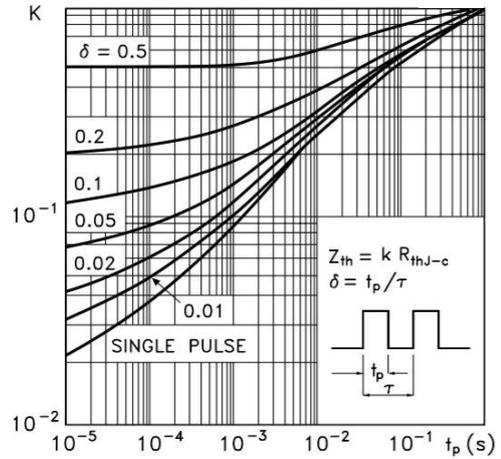


Fig.2 Thermal impedance for TO-220

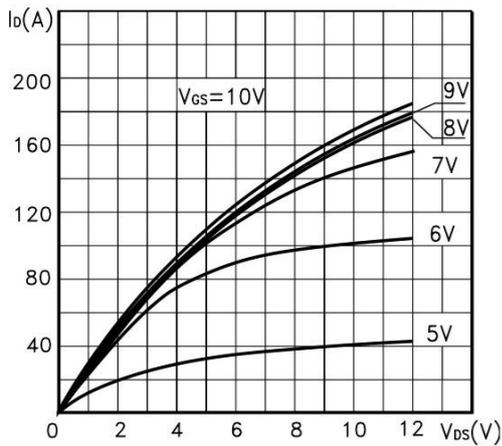


Fig.3 Output characteristics

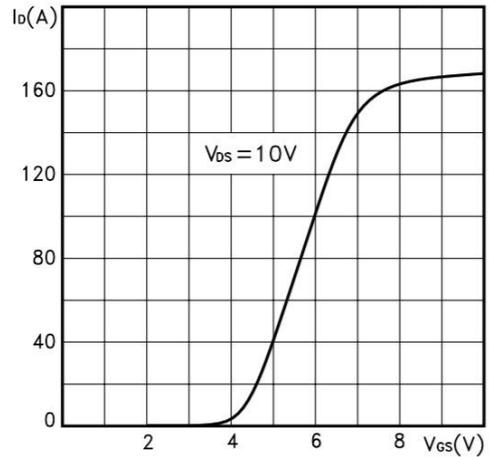


Fig.4 Transfer characteristics

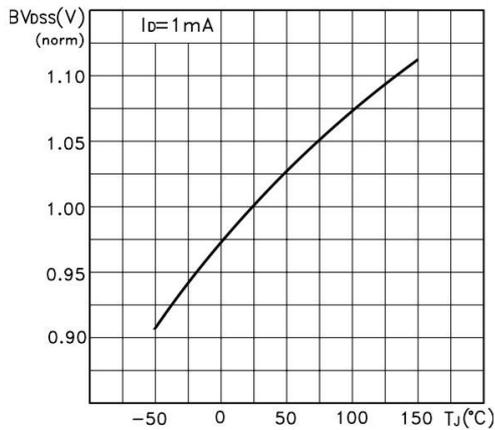


Fig.5 Normalized BVDSS vs temperature

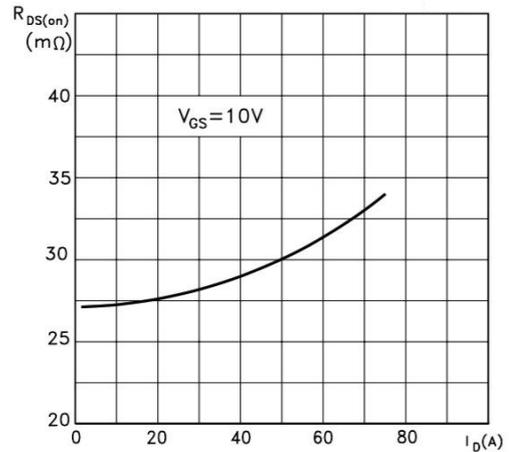


Fig.6 Static drain-source on resistance

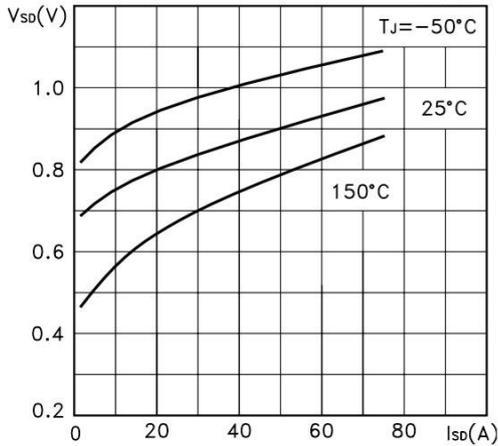


Fig.7 Source-drain diode forward characteristics

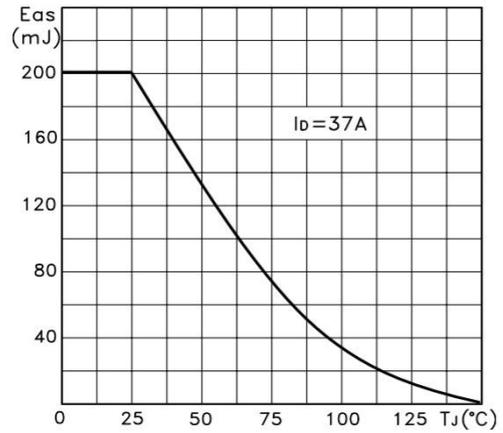


Fig.8 Avalanche energy vs starting \$T_j\$

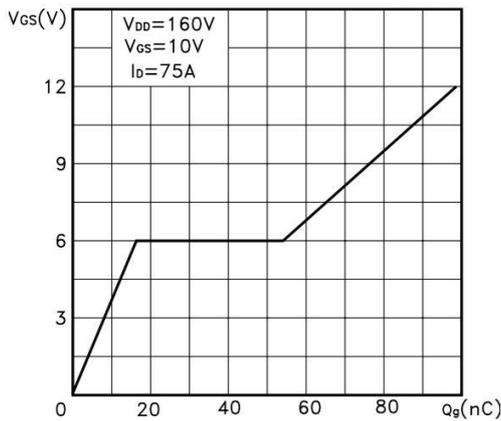


Fig.9 Gate charge vs gate-source voltage

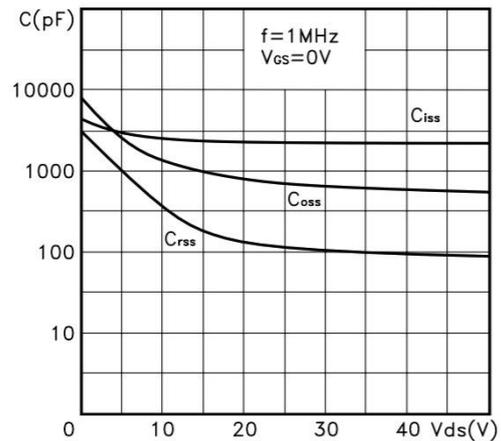


Fig.10 Capacitance variations

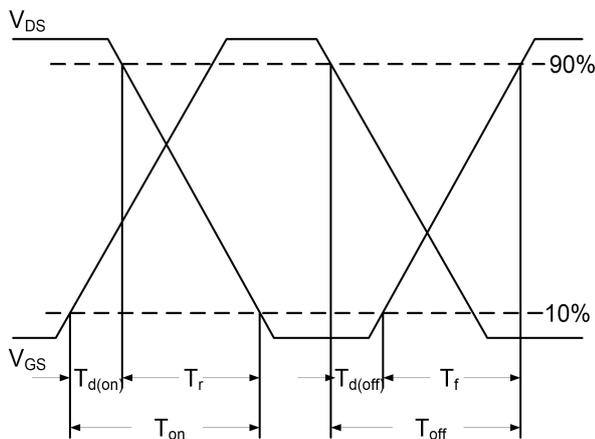


Fig.11 Switching Time Waveform

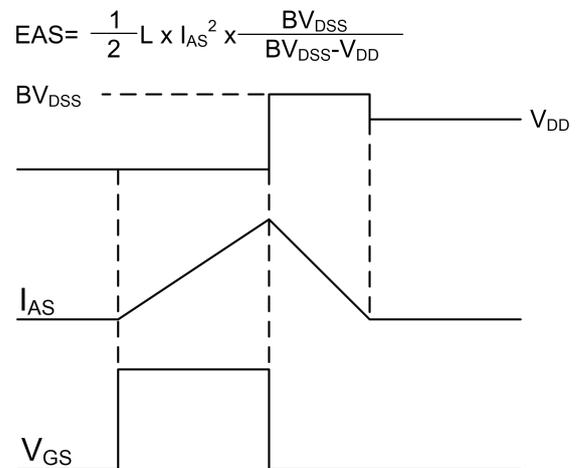


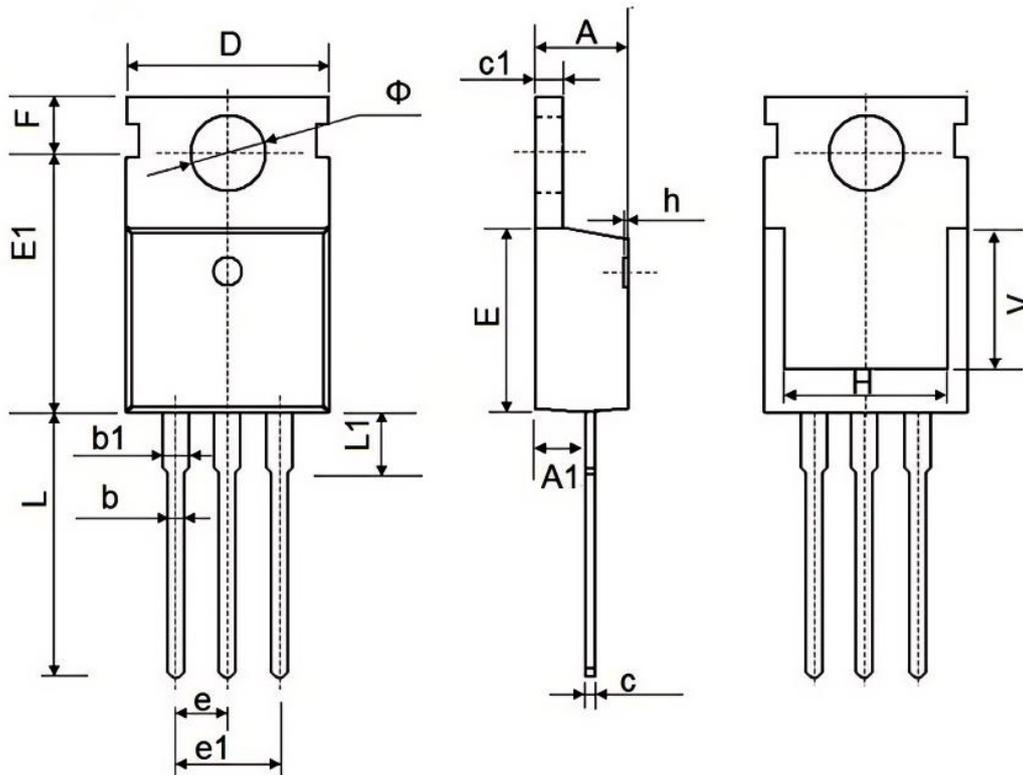
Fig.12 Unclamped Inductive Switching Waveform



Ordering Information

Part Number	Package code	Packaging
HSP200N02	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



HSP200N02 Marking:

