



General Description

The HSP120P03 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSP120P03 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

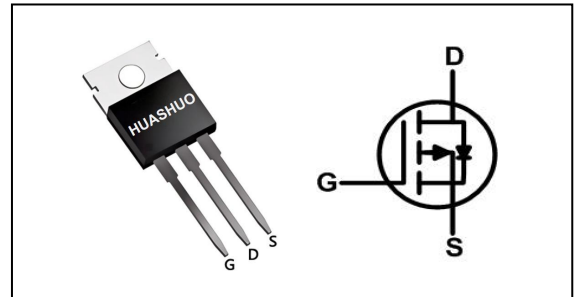
Product Summary

V_{DS}	-30	V
$R_{DS(ON),typ}$	3.5	m Ω
I_D	-120	A

Features

- Super Low Gate Charge
- 100% EAS Guaranteed
- 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	-30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, V_{GS} @ -10V ^{1,6}	-120	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, V_{GS} @ -10V ^{1,6}	-89	A
I_{DM}	Pulsed Drain Current ²	-504	A
EAS	Single Pulse Avalanche Energy ³	576	mJ
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ⁴	200	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 (Steady State)	---	62	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-case ¹	---	0.81	$^{\circ}C/W$



Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-30	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V$, $I_D=-20A$	---	3.5	3.9	$m\Omega$
		$V_{GS}=-4.5V$, $I_D=-20A$	---	5.1	6	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=-250\mu A$	-1.0	-1.6	-2.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-24V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-24V$, $V_{GS}=0V$, $T_J=55^\circ\text{C}$	---	---	-5	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
Q_g	Total Gate Charge (-10V)	$V_{DS}=-15V$, $V_{GS}=-10V$, $I_D=-20A$	---	125	---	nC
Q_{gs}	Gate-Source Charge		---	12	---	
Q_{gd}	Gate-Drain Charge		---	31	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V$, $V_{GS}=-10V$, $R_G=3.3\Omega$, $I_D=-20A$	---	14	---	ns
T_r	Rise Time		---	12	---	
$T_{d(off)}$	Turn-Off Delay Time		---	66	---	
T_f	Fall Time		---	35	---	
C_{iss}	Input Capacitance	$V_{DS}=-15V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	7300	---	pF
C_{oss}	Output Capacitance		---	819	---	
C_{rss}	Reverse Transfer Capacitance		---	530	---	

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	$V_{GS}=0V$, $I_S=-1A$, $T_J=25^\circ\text{C}$	---	---	-1.2	V

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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=-15V$, $V_{GS}=-10V$, $L=0.5mH$, $R_G=25\Omega$
- 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
- 6.The maximum current rating is package limited.



Typical Characteristics

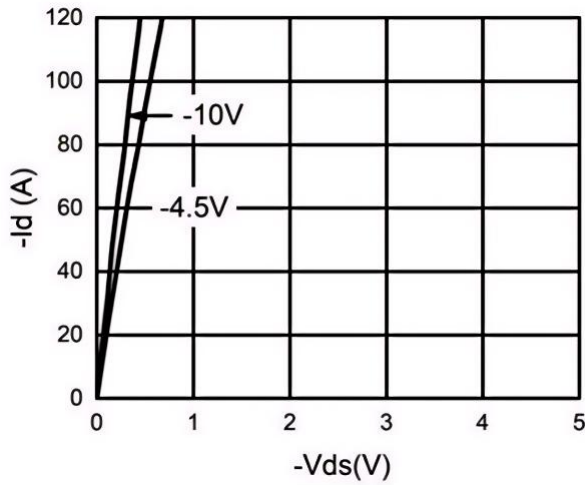


Fig.1 Typical Output Characteristics

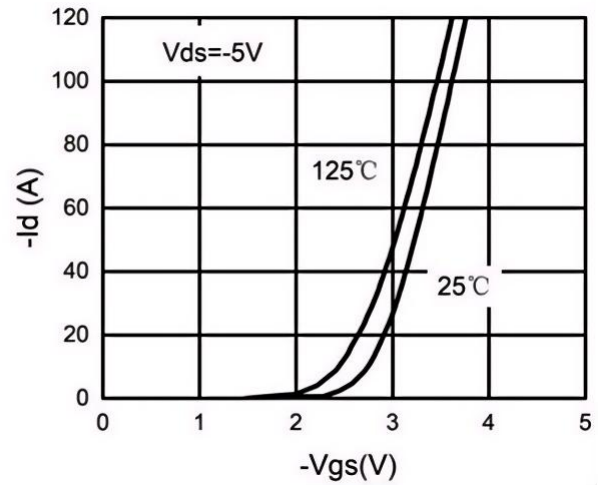


Fig.2 Transfer Characteristics

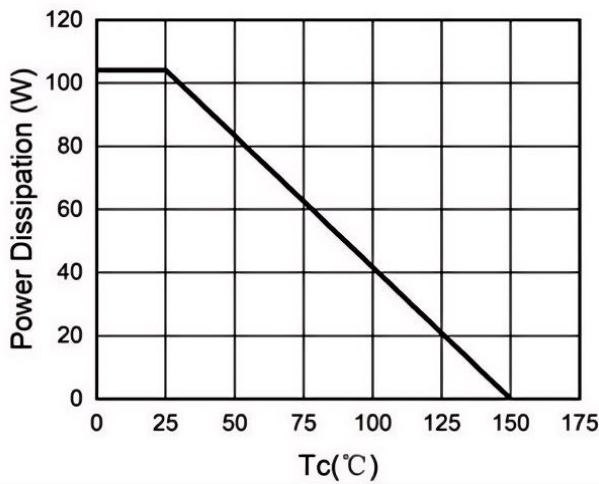


Fig.3 Power Dissipation

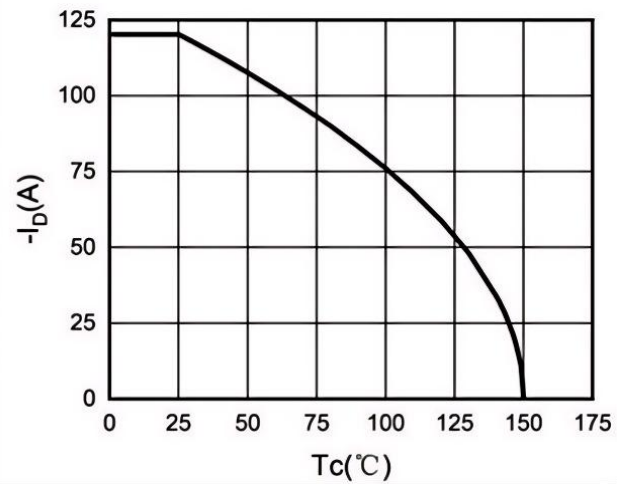


Fig.4 Drain Current

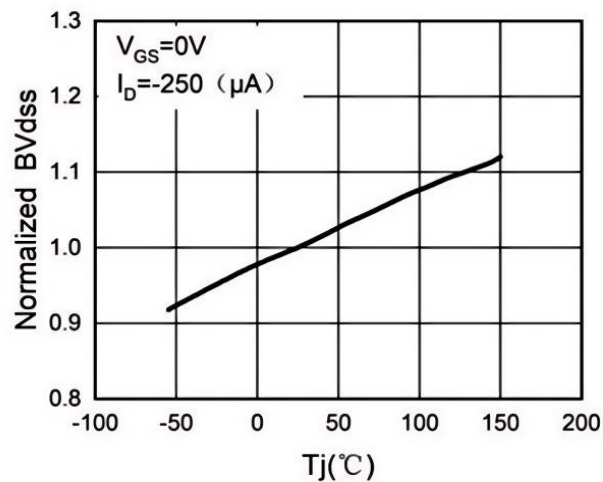


Fig.5 BV_{DSS} vs Junction Temperature

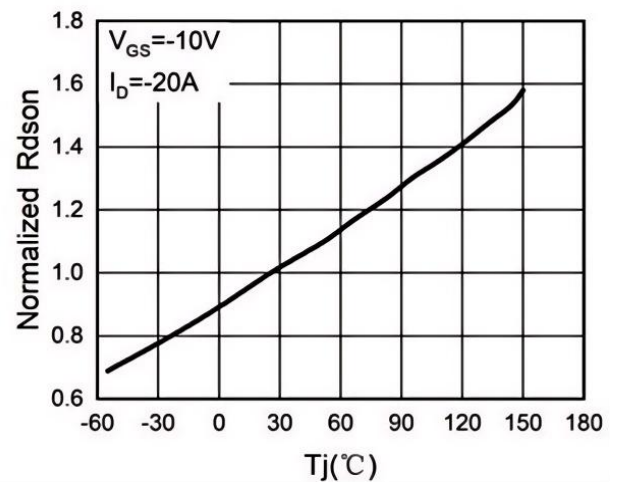
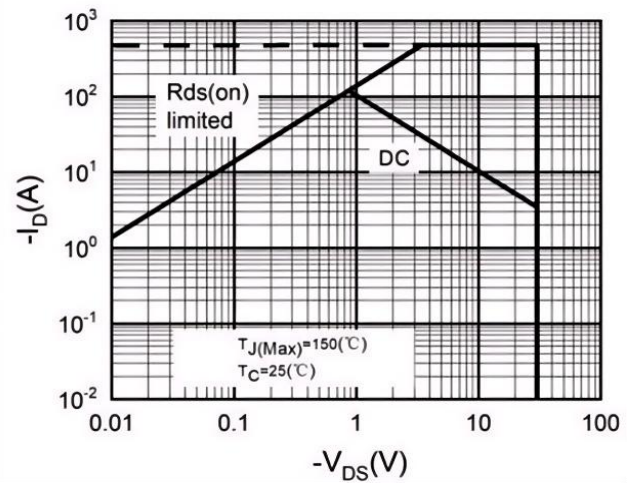
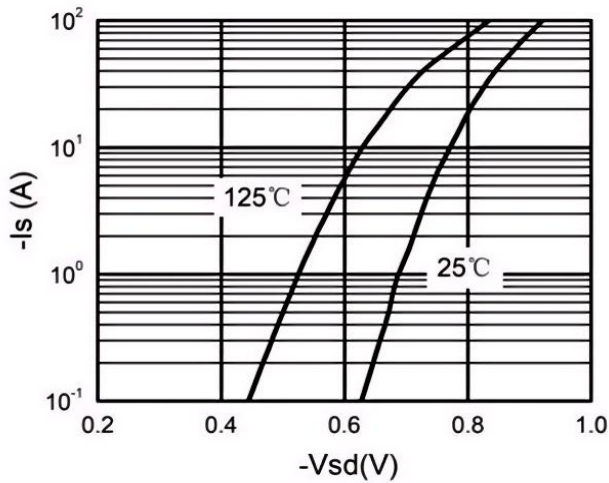
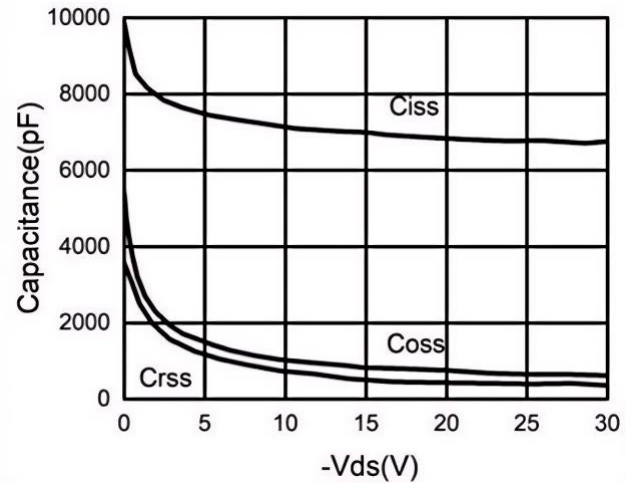
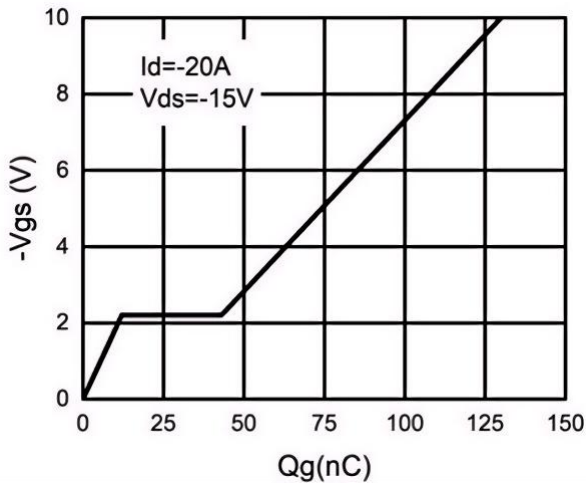


Fig.6 $R_{DS(ON)}$ vs Junction Temperature

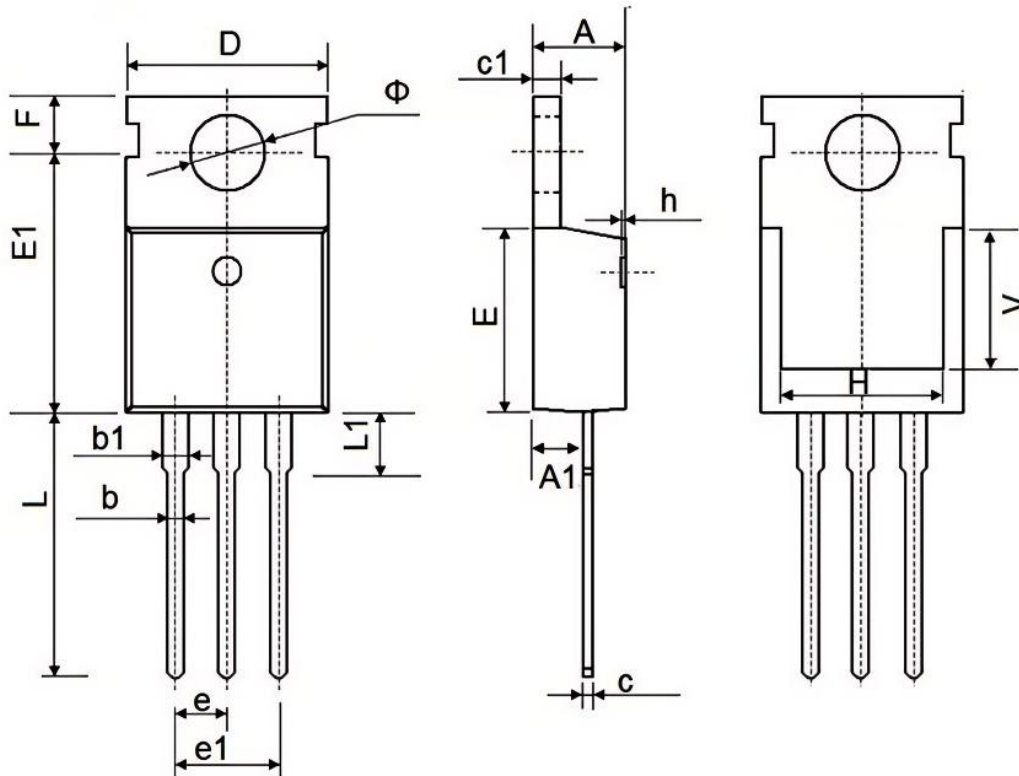




Ordering Information

Part Number	Package code	Packaging
HSP120P03	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



HSP120P03 Marking:

