



### Description

The HSP5N25 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.

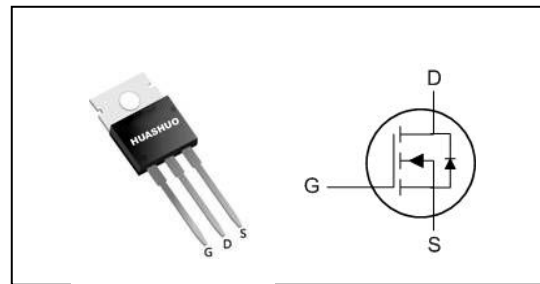
The HSP5N25 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- Super Low Gate Charge
- Green Device Available
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology

### Product Summary

$V_{DS}$	250	V
$R_{DS(ON),max}$	1.2	$\Omega$
$I_D$	5	A

### TO220 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	200	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	5	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	3	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	16	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	16	mJ
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>3</sup>	38	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 <sup>1</sup>	---	70	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	4	$^\circ C/W$



**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	250	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =1A	---	970	1200	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1	1.8	3	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =250V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =250V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	100	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ± 20V, V <sub>DS</sub> =0V	---	---	± 100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =1A	---	7.9	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	1.8	---	Ω
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =1A	---	12.5	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.5	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =100V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω I <sub>D</sub> =1A	---	13	---	ns
T <sub>r</sub>	Rise Time		---	9	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	38	---	
T <sub>f</sub>	Fall Time		---	8	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, f=1MHz	---	670	---	pF
C <sub>oss</sub>	Output Capacitance		---	14	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	8	---	

**Diode Characteristics**

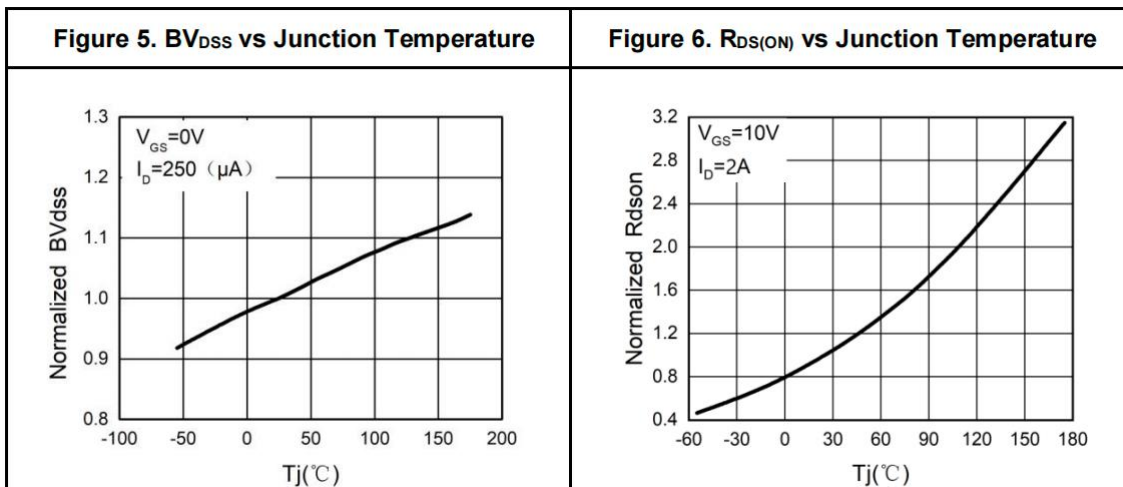
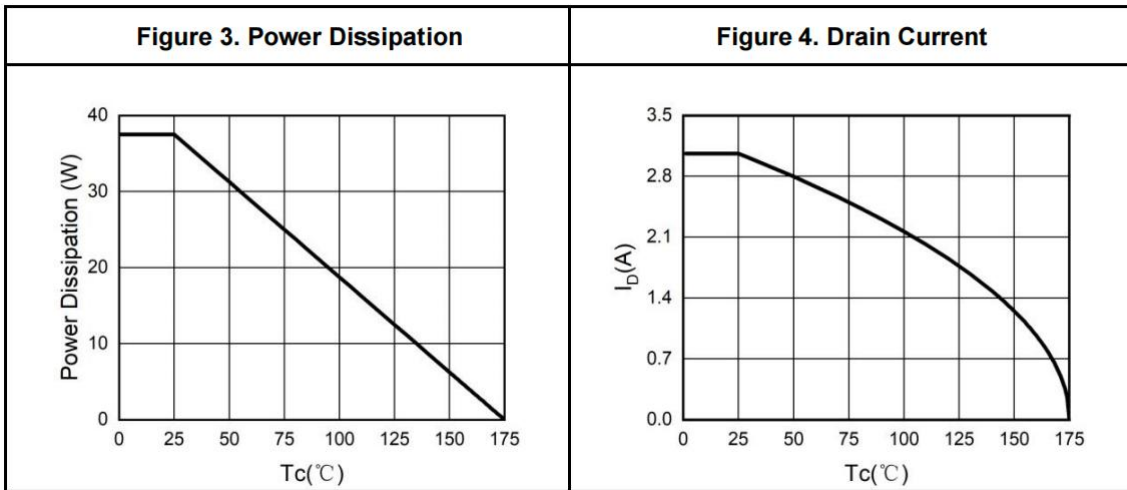
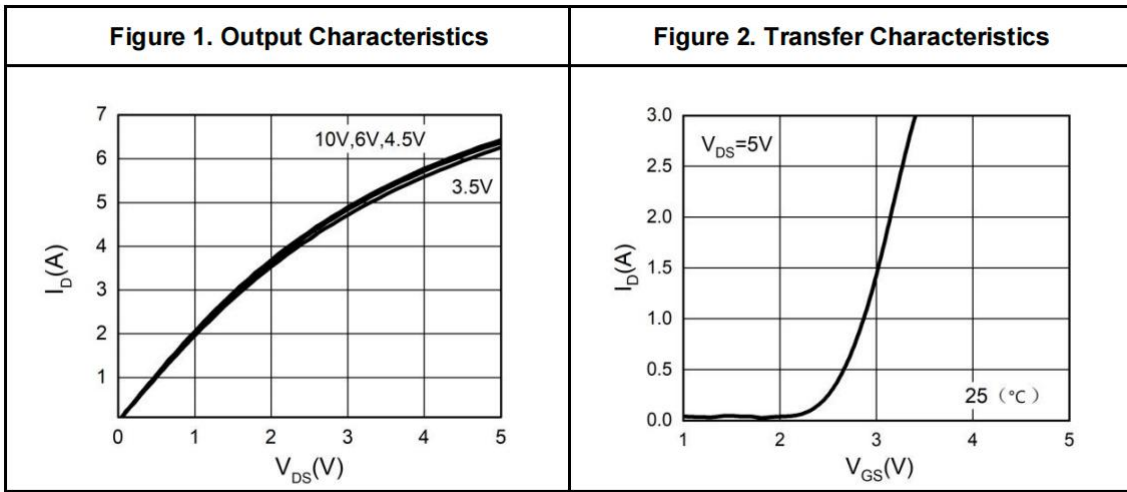
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	5	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	16	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =1A, di/dt=100A/μs,	---	75	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25°C	---	270	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup>FR-4 board with 20Z copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

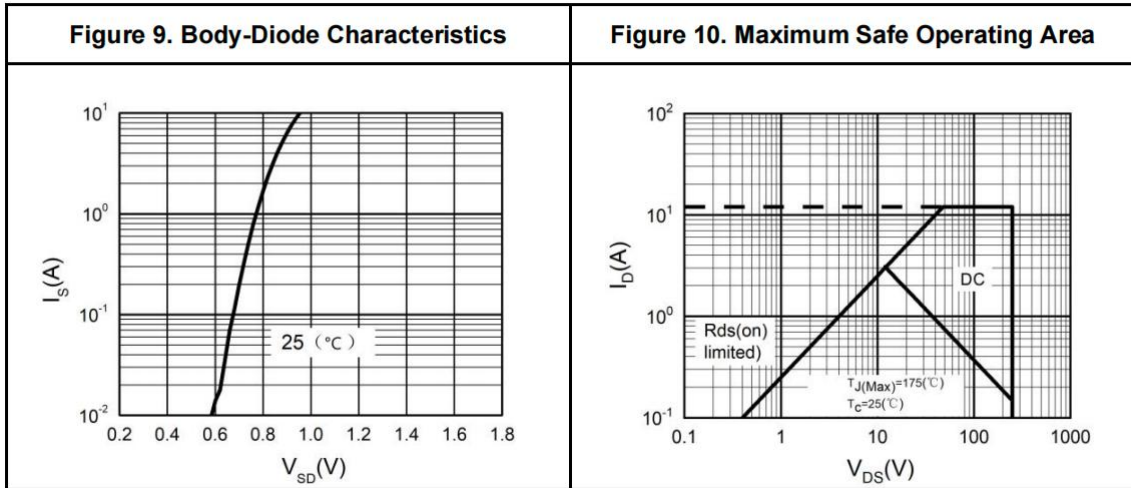
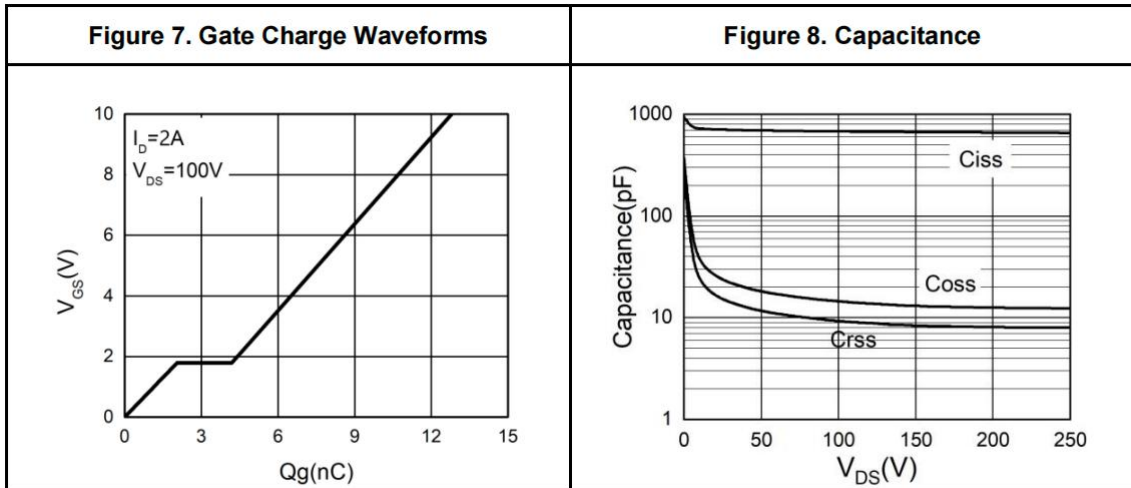


### Typical Characteristics



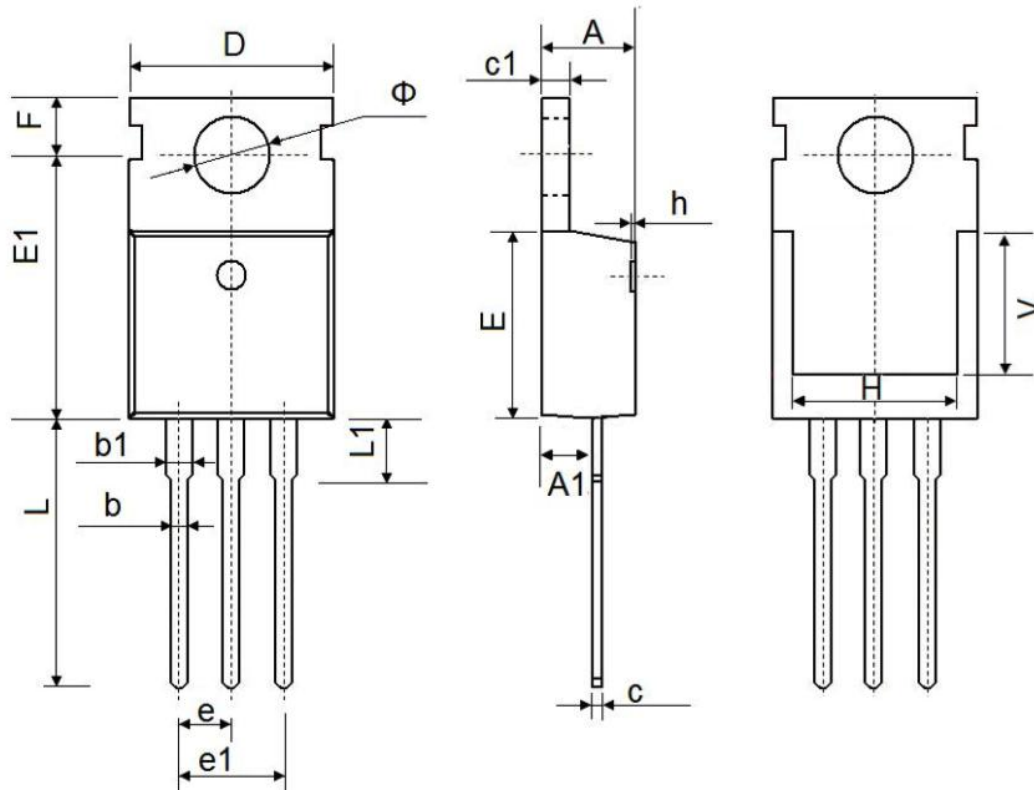


## N-Ch 250V Fast Switching MOSFETs





**TO-220 Package Information**



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