

N-Ch 250V Fast Switching MOSFETs Product Summary

V_{DS}	250	V
$R_{DS(ON),max}$	44	m Ω
I_D	50	A

General Description

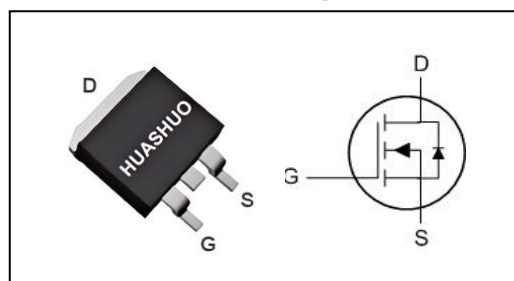
The HSH044N25 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(on)}$ and gate charge for most of the synchronous buck converter applications.

The HSH044N25 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 Trench Technology

TO-263 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	250	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	50	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	34	A
I_{DM}	Pulsed Drain Current ²	195	A
EAS	Single Pulse Avalanche Energy ³	165	mJ
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ³	325	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	60	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.48	$^\circ\text{C}/\text{W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	250	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=5A$	---	34	44	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	3	4.1	5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=150V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=150V$, $V_{GS}=0V$, $T_J=125^\circ\text{C}$	---	---	100	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=10V$, $I_D=20A$	---	75	---	S
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	1.5	---	Ω
Q_g	Total Gate Charge (10V)	$V_{DS}=50V$, $V_{GS}=10V$, $I_D=40A$	---	155	---	nC
Q_{gs}	Gate-Source Charge		---	23	---	
Q_{gd}	Gate-Drain Charge		---	45	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=50V$, $V_{GS}=10V$, $R_G=3.3\Omega$ $I_D=40A$	---	33	---	ns
T_r	Rise Time		---	8.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	65	---	
T_f	Fall Time		---	6	---	
C_{iss}	Input Capacitance	$V_{DS}=50V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	8547	---	pF
C_{oss}	Output Capacitance		---	429	---	
C_{rss}	Reverse Transfer Capacitance		---	85	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V$, Force Current	---	---	50	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=20A$, $T_J=25^\circ\text{C}$	---	---	1.2	V
t_{rr}	Reverse Recovery Time	$I_F=40A$, $dI/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	157	---	nS
Q_{rr}	Reverse Recovery Charge		---	1073	---	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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=40V$, $V_{GS}=10V$, $L=0.5mH$, $R_g=25\Omega$
- 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.



Typical Characteristics

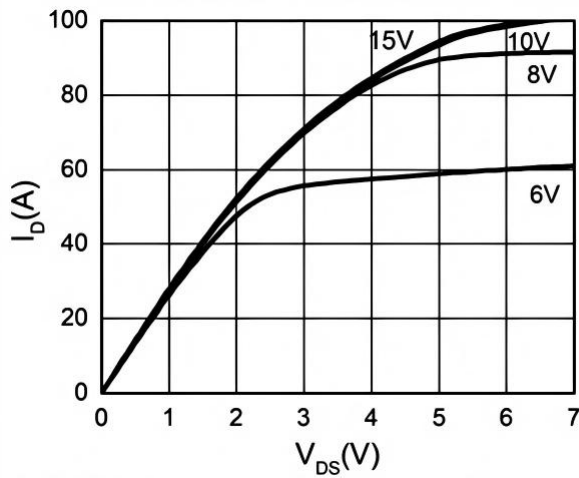


Fig.1 Typical Output Characteristics

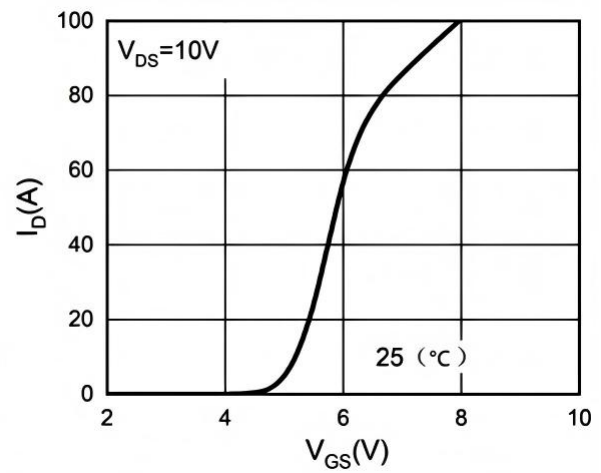


Fig.2 Transfer Characteristics

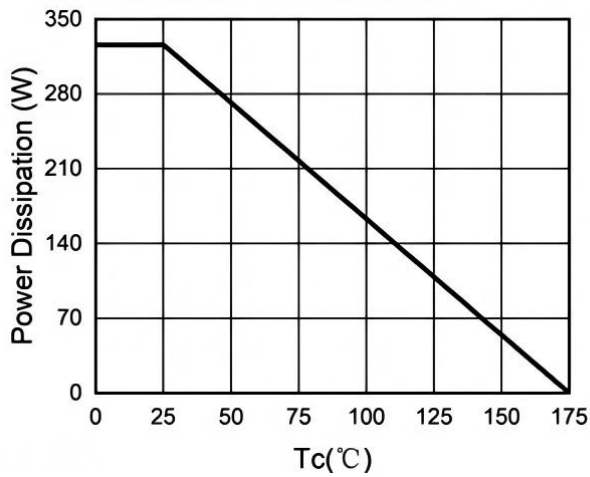


Fig.3 Power Dissipation

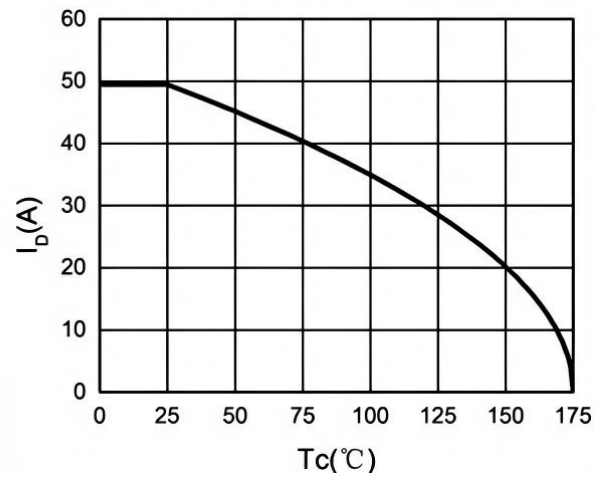


Fig.4 Drain Current

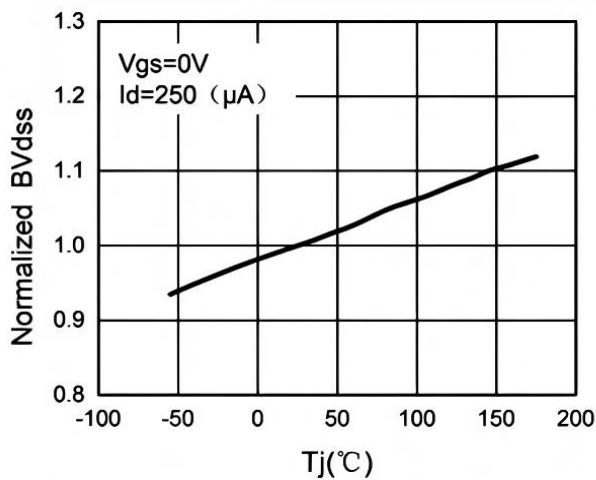


Fig.5 BV_DS vs Junction Temperature

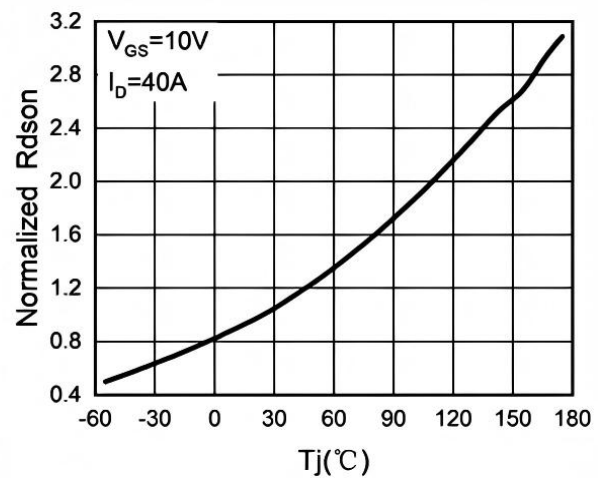


Fig.6 R_DS(ON) vs Junction Temperature



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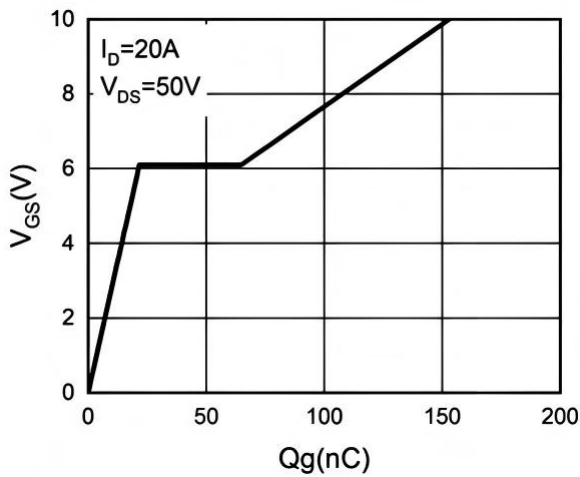


Fig.7 Gate Charge Waveforms

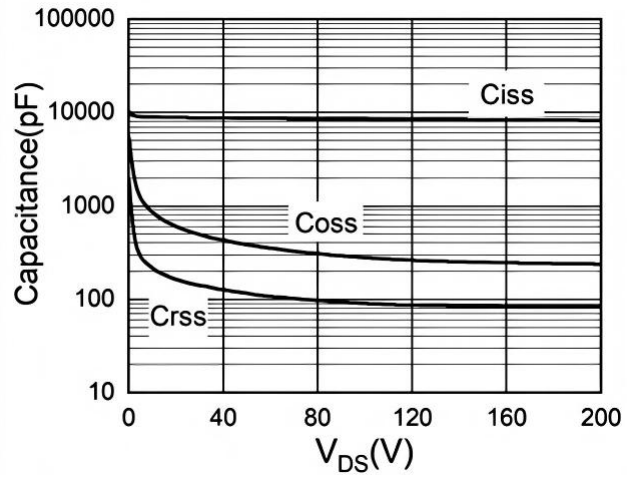


Fig.8 Capacitance

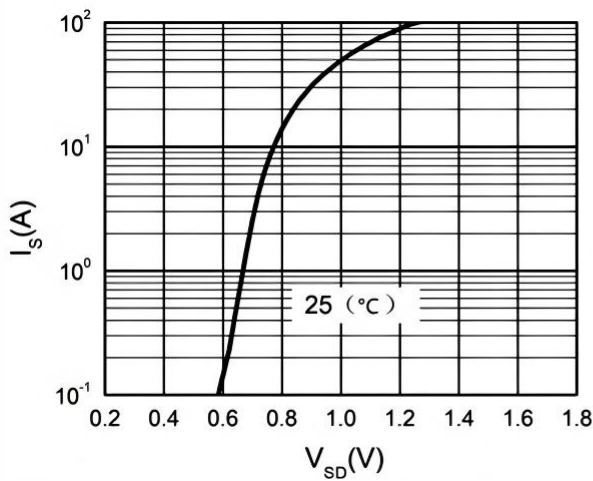


Fig.9 Body Diode Characteristics

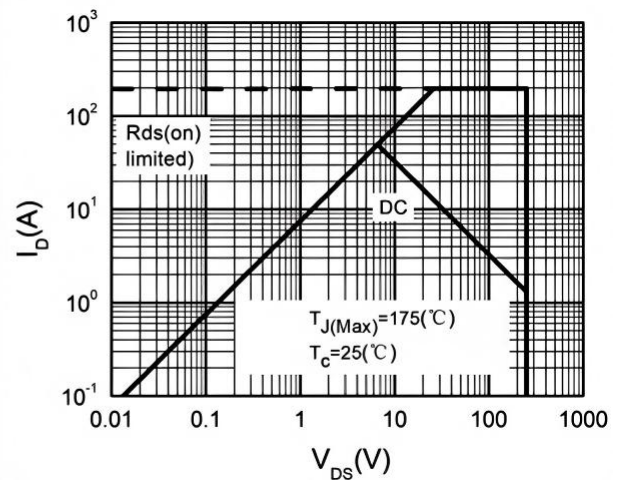


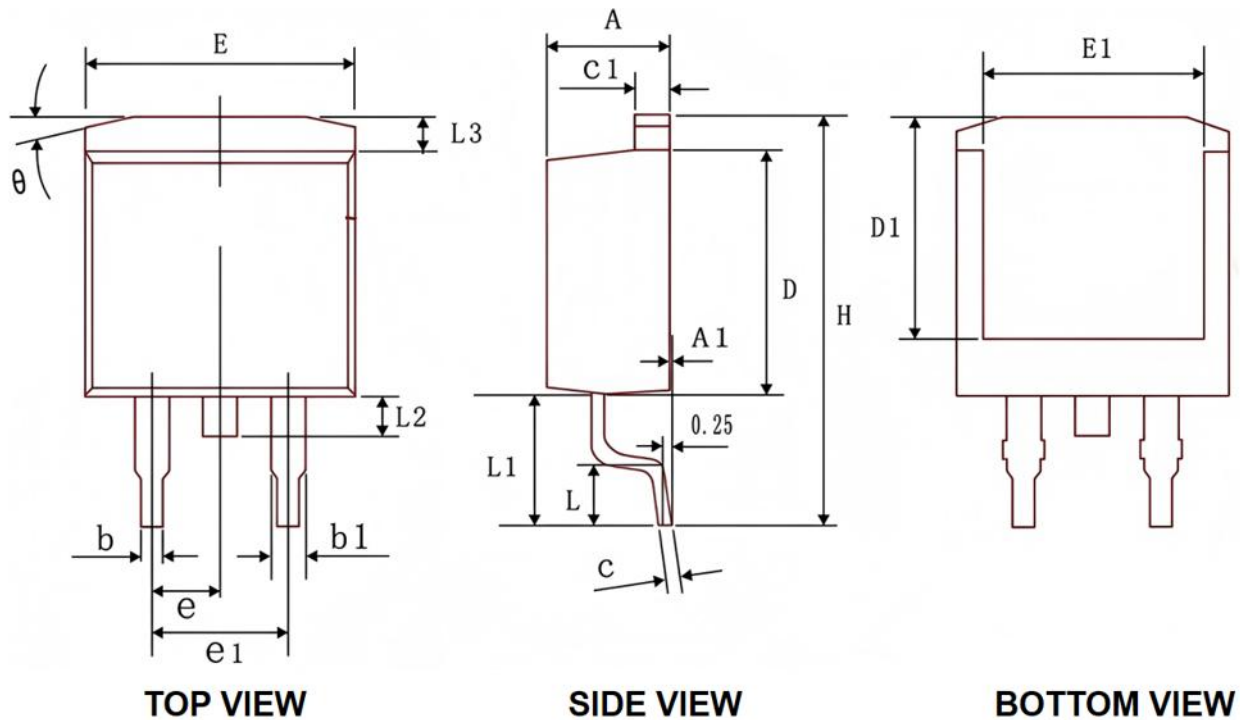
Fig.10 Maximum Safe Operating Area



Ordering Information

Part Number	Package code	Packaging
HSH044N25	TO-263	800/Tape&Reel

TO-263 Package Outline



COMMON DIMENSIONS(UNIT OF MEASURE - MM)

SYMBOL	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	0.00	-	0.25
b	0.70	0.83	0.96
b1	1.00	1.24	1.47
C	0.35	0.45	0.55
C1	1.25	1.30	1.35
D	8.50	8.90	9.30
D1	7.50	8.00	8.50
H	14.7	15.20	15.7
E	9.80	10.08	10.4
E1	7.35	7.80	8.25
e1	4.93	5.08	5.23
L	2.00	2.30	2.60
L1	4.50	4.75	5.00
L2	1.30	1.53	1.75
L3	1.10	1.29	1.47
e	2.54 BSC		
θ	13°TYP		



HSH044N25 Marking:

