650V,10A,160mΩ GaN HEMT

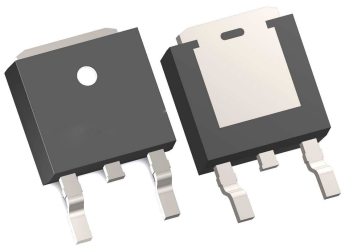
Contents

1. Features

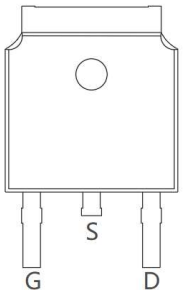
- 650 V enhancement mode power switch
- $R_{DS(on)}$ =160 mΩ
- $I_{DS(max)}$ = 10 A
- Easy gate drive requirements (0 V to 6 V)
- Very high switching frequency (> 10 MHz)
- Fast and controllable fall and rise times
- Zero reverse recovery loss

2. Device Information

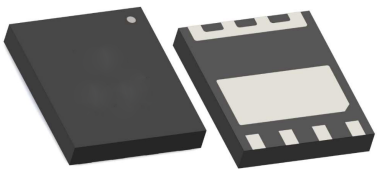
Part Number	Marking Code	Package	Packing
HN65H10R160	HN6510R	TO252	Tape 2.5k/reel
HN65H10Q160	HN6510Q	DFN5x6	Tape 3k/reel
HN65H10D160	101YWWXX	PDDFN4x4	Tape 3k/reel
HN65H10S160	HN6510S	DFN8x8	Tape 3k/reel



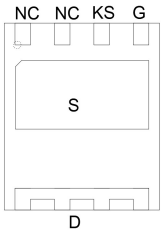
TO252



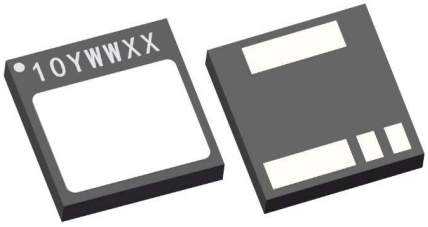
Top View



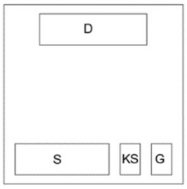
DFN5x6



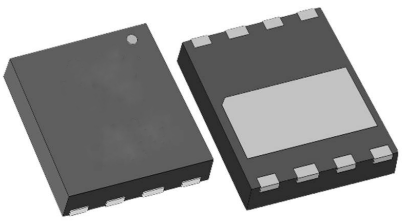
Bottom View



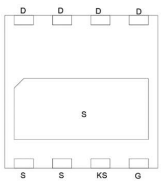
PDDFN4x4



Bottom View



DFN8x8



Bottom View

3. Applications

- Fast Battery Charging
- LED lighting drivers
- Power Factor Correction
- LLC Converters
- Wireless Power Transfer

4. Description

HN65H10x160 is an enhancement mode GaN-on-silicon transistor. GaN is a wide band gap semiconductor with high power density. The gallium nitride transistor is characterized by no body diode, so the reverse recovery charge is zero. There are four packages (TO252, DFN5x6 ,PDDFN4x4 and DFN8x8) for customers to choose. It is specially stated that PDDFN4x4 is the world's smallest 650V E-Mode GaN HEMT independently developed by our company. It has a double-sided heat dissipation function and can be connected to an external heat sink. It adopts RDL assembly process and has extremely low parasitic resistance and inductance, so it is particularly suitable for high High-frequency and high-power applications

5. Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Parameter	Symbol	Value	Unit	Condition
Drain-Source voltage	V_{DS}	650	V	
Gate-source voltage	V_{GS}	-10 to 6	V	
Continuous drain current*	I_D	10	A	Tc=25℃
		8	A	Tc=100℃
Operation and storage temperature	Tj	-55 to 150	℃	
	Tstg	-55 to 150	℃	

* An Estimated Value

6. **Electrical Characteristics** (Tc=25℃ unless otherwise specified)

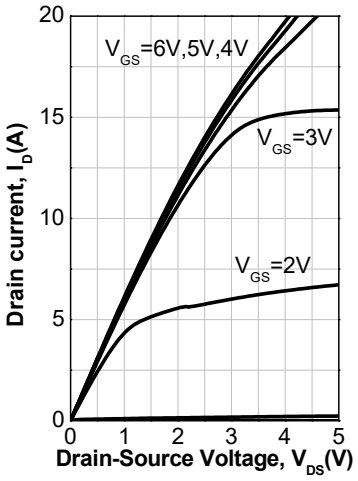
6.1 Typical Performance – Static

Parameter	Symbol	Values			Unit	Test condition
		Min.	Type.	Max.		
Drain source breakdown voltage	BV_{DS}	650	/	/	V	VGS=0V, ID=20μA
Total drain leakage current	I_{DSS}	/	/	10	μA	VDS=650V, VGS=0V, Tj=25℃
		/	/	50	μA	VDS=650V, VGS=0V, Tj=150℃
Gate-to-source current	I_{GS}	/	100	/	μA	VDS=0V, VGS=6V, Tj=25℃
		/	500	/	μA	VDS=0V, VGS=6V, Tj=150℃
Static drain-source on-resistance	$R_{DS(ON)}$	/	160	/	mΩ	VGS=6V, ID=5A, Tj=25℃
		/	370	/	mΩ	VGS=6V, ID=5A, Tj=150℃
Gate threshold voltage	$V_{GS(th)}$	0.8	/	1.2	V	VDS=VGS, ID=3.5mA,

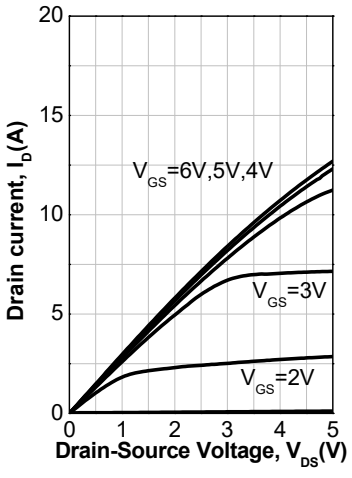
6.2 Typical Performance – Dynamic

Parameter	Symbo	Values			Unit	Test condition
		Min	Type	Max		
Input capacitance	C_{ISS}	/	60	/	pF	V_{DS}=400V, V_{GS}=0V, f=1MHz
Output capacitance	C_{OSS}	/	24	/	pF	
Reverse transfer capacitance	C_{RSS}	/	0.7	/	pF	
Output capacitance, energy related	$C_{OSS(er)}$	/	34	/	pF	V_{DS}=0V to 400V,V_{GS}=0V
Output capacitance time related	$C_{OSS(tr)}$	/	44	/	pF	
Total gate charge	Q_G	/	2.0	/	nC	V_{DS}=400V, V_{GS}=0V to 6V
Gate-drain charge	Q_{GD}	/	0.9	/	nC	
Gate-source charge	Q_{GS}	/	0.4	/	nC	
Gate Resistance	R_G	/	0.69	/	Ω	*f* = *f*res, Open drain

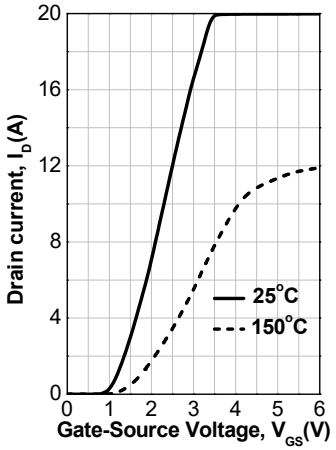
6.3 Characteristic Curve



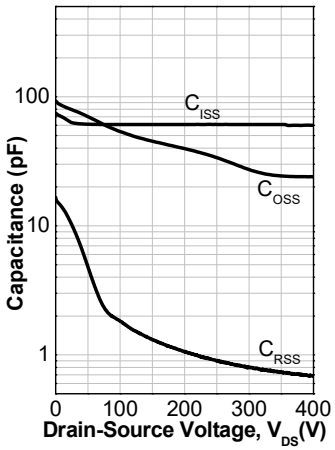
Typical output characteristics @ Tj=25℃



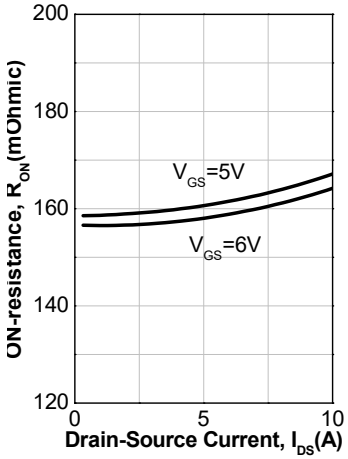
Typical output characteristics @ Tj=150℃



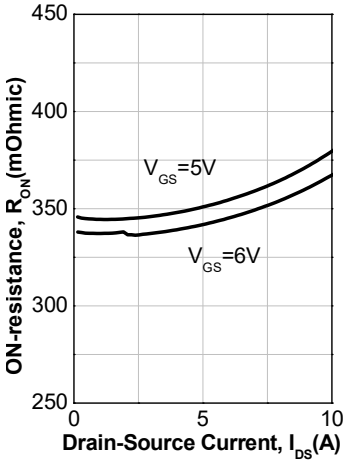
Typical transfer characteristics @ VDS=5V



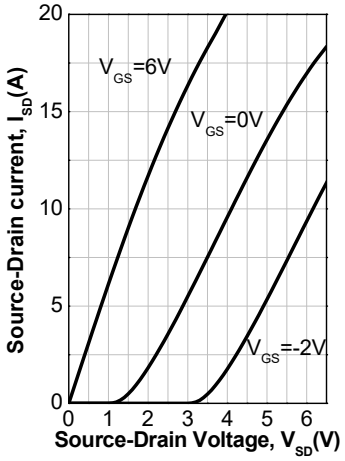
Typical capacitance characteristics @ 1MHz



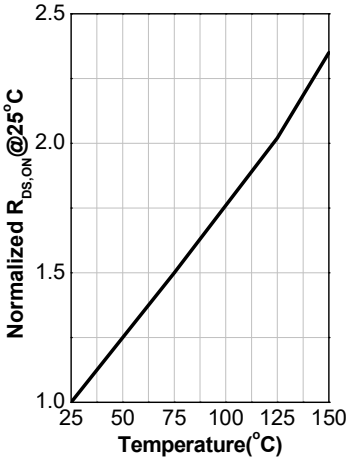
ON-resistance for various drain current @ 25℃



ON-resistance for various drain current @150℃



Typical reverse conduction characteristics

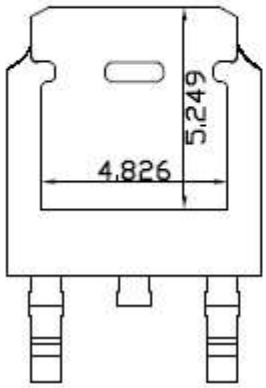


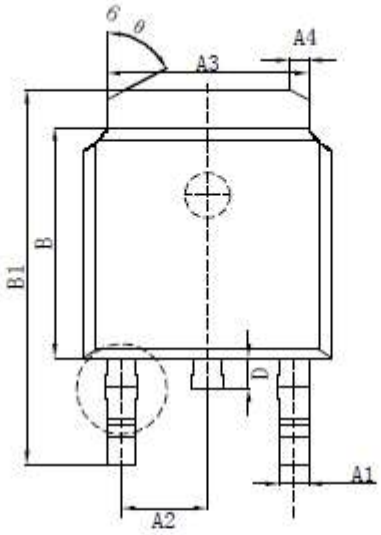
Normalized ON-resistance at various temperatures

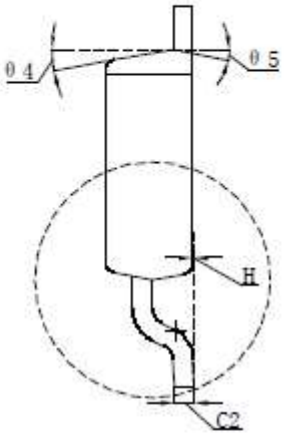
7. Package

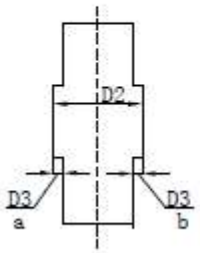
7.1 TO252

尺寸 / 标注	最小(mm)	最大(mm)	尺寸 / 标注	最小(mm)	最大(mm)
A	6.50	6.70	D1	1.40	1.60
A1	0.71	0.81	D2	0.81	0.91
A2	2.236	2.336	D3	0.05TYP	
A3	5.284	5.384	H	0.00	0.10
A4	0.75	0.85	R	0.40TYP	
B	6.00	6.20	θ1	0° ━ 8°	
B1	9.80	10.10	θ2	8.5° TYP4	
C	2.20	2.40	θ3	25° TYP	
C1	0.967	1.087	θ4	10° TYP2	
C2	0.498	0.518	θ5	10° TYP	
D	0.70	0.90	θ6	70° TYP	

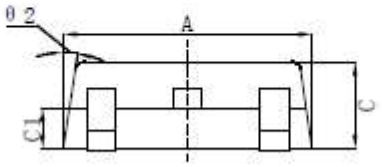


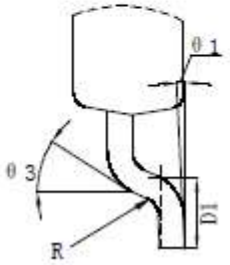






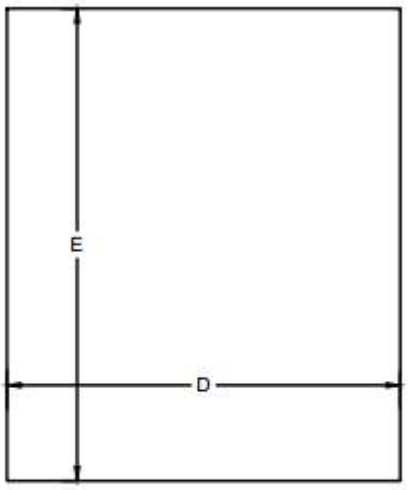
0<a、b<0.1



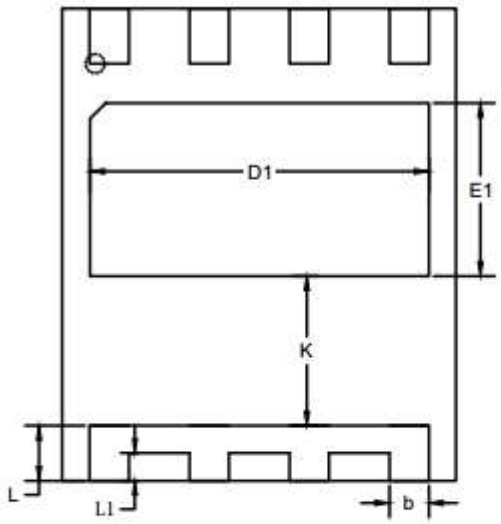


7.2 DFN5x6

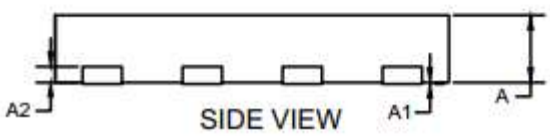
尺寸对照表(单位：mm)			
	Min.	Nom.	Max.
A	0.80	0.85	0.90
A1	-	0.02	0.05
A2	0.2(REF)		
b	0.45	0.50	0.55
D	4.90	5.00	5.10
D1	4.20	4.30	4.40
E	5.90	6.00	6.10
E1	2.10	2.20	2.30
e	1.27		
k	1.9	-	-
L	0.65	0.7	0.75



TOP VIEW



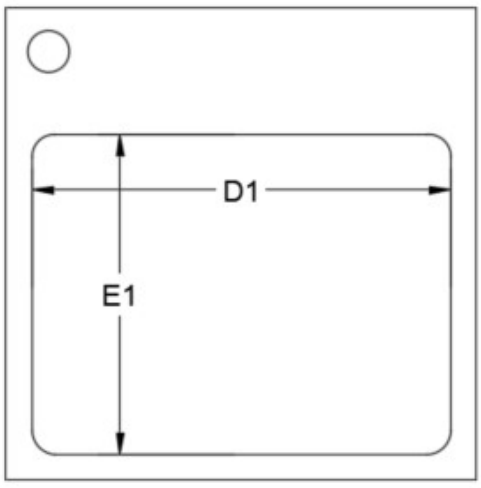
BOTTOM VIEW



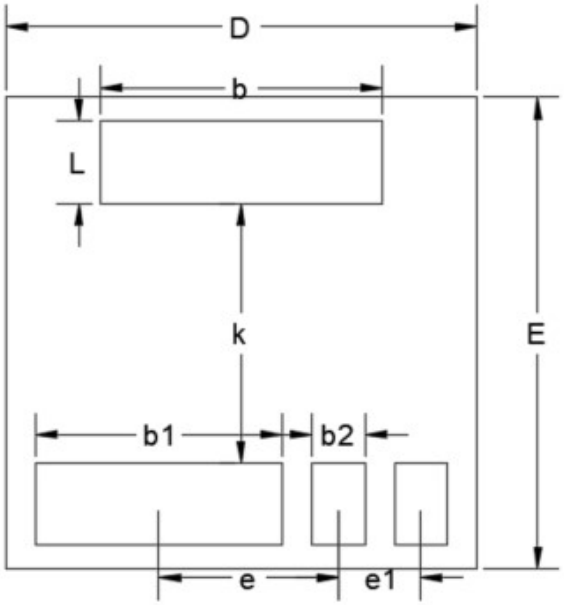
SIDE VIEW

7.3 PDDFN4x4

尺寸对照表Dimensions(mm)			
符号Symbol	最小值Min	典型值Typ	最大值Max
A	0.50	0.55	0.6
A1	0.007	0.012	0.017
b	2.35	2.4	2.45
b1	2.05	2.1	2.15
b2	0.4	0.45	0.5
D	3.9	4	4.1
D1	3.45	3.55	3.65
E	3.9	4	4.10
E1	2.62	2.72	2.82
e	REF 1.525		
e1	REF 0.7		
k	REF 2.2		
L	0.65	0.7	0.75



TOP VIEW



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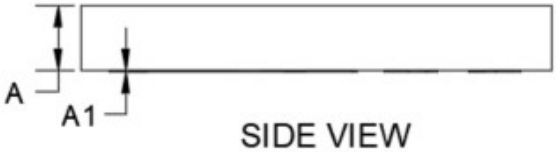
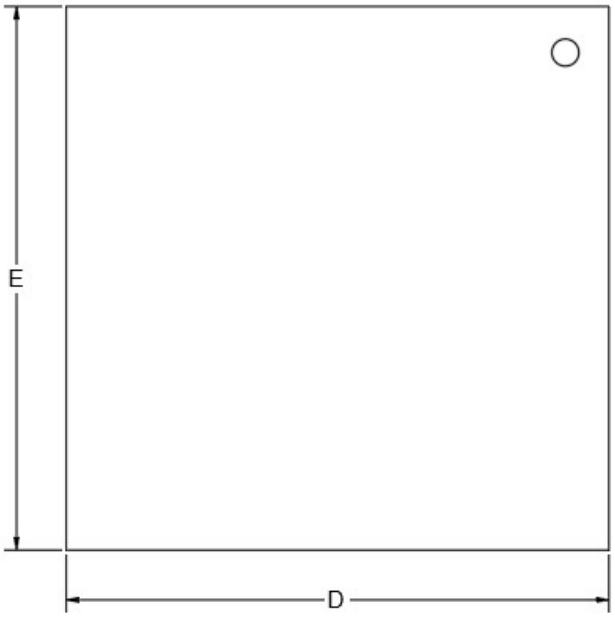


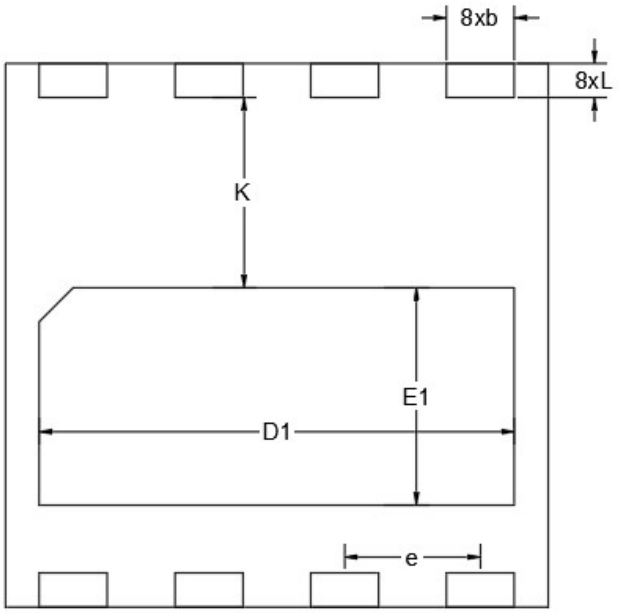
SIDE VIEW

7.4 DFN8x8

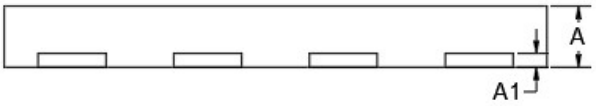
Dimensions(mm)			
Symbol	Min	Typ	Max
A	0.80	0.9	1
A1		REF 0.203	
b	0.95	1	1.05
D	7.9	8	8.1
D1	6.9	7	7.1
E	7.9	8	8.10
E1	3.1	3.2	3.30
e		REF 2	
k		REF 2.8	
L	0.45	0.5	0.55



TOP VIEW



BOTTOM VIEW



SIDE VIEW