3DD13005NF

NPN HIGH-VOLTAGE POWER TRANSISTOR DIE

Pb-Free RoHS COMPLIANT

V_{CBO}: 700 V	I_C: 4 A	Package: TO-220F

FEATURES

- NPN High-Voltage Power Transistor.
- Low Switching Loss For High Efficiency.
- Good High-Temperature characteristics For High Reliability.
- Low Reverse Leakage For High Reliability.

MECHANICAL DATA

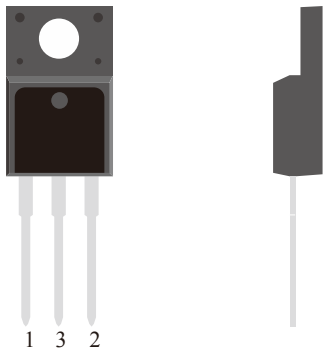
- **Package:** Molding Compound Meets UL 94V-0 Flammability Rating.

  The Material Of Product Compliance With RoHS Requirements.
- **Mounting Position:** Any.
- **Pin and polarity:**As Shown In The Figure On The Right.

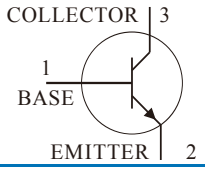
Device DATA

Device	3DD13005NF
Marking	3DD13005NF

Diagram:



Polarity:



Maximum Ratings (Ta=25℃ Unless otherwise specified)

Parameter	Test Conditions	Symbol	Ratings	Unit
Collector-Base Voltage		V_{CBO}	700	V
Collector-Emitter Voltage		V_{CEO}	420	V
Emitter-Base Voltage		V_{EBO}	9	V
Collector Current		I_C	4	A

Thermal Characteristcs (Ta=25℃ Unless otherwise specified)

Parameter	Test Conditions	Symbol	Ratings	Unit
Total Device Power Dissipation		P_D	2000	mW
Derating Factor	above 25°C	D_F	16.0	mW/℃
Operating Junction Temperature Range		T_J	-55 to 150	℃
Storage Temperature Range		T_{STD}	-55 to 150	℃
Thermal Resistance From Junction To Ambient With Steady-State	Device Mounted On 75mm x 45mm x 2.5mm Alu. Heat.	$R_{\theta JA}$	62.5	℃/W

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ELECTRICAL CHARACTERISTICS (Ta= 25°C)

Characteristic	Test Condition	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	I_C= 1 mAdc,I_E= 0	$V_{(BR)CBO}$	700	-	-	V
Collector-Emitter Breakdown Voltage	I_C= 10 mAdc,I_B= 0	$V_{(BR)CEO}$	420	-	-	V
Emitter-Base Breakdown Voltage	I_E= 1 mAdc,I_C= 0	$V_{(BR)EBO}$	9	-	-	V
Emitter Cut-off Current	V_{CB}= 700 Vdc,I_E= 0	I_{CBO}	-	-	100	uA
Base Cut-off Current	V_{CE}= 400 Vdc,I_B= 0	I_{CEO}	-	-	100	uA
Collector Cut-off Current	V_{EB}= 7 Vdc,I_C= 0	I_{EBO}	-	-	100	uA
ON CHARACTERISTICS						
DC Current Gain	V_{CE}= 5 V,I_C= 1000 mA	$H_{FE(1)}$	10	-	40	-
	V_{CE}= 5 V,I_C= 200 mA	$H_{FE(2)}$	10	-	60	
	V_{CE}= 5 V,I_C= 10 mA	$H_{FE(3)}$	5	-	-	
	V_{CE}= 5 V,I_C= 4000 mA	$H_{FE(4)}$	8	-	40	
Collector-Emitter Saturation Voltage	I_C= 1000 mA,I_B= 200 mA	$V_{CE(Sat)}$	-	-	0.3	V
	I_C= 2000 mA,I_B= 400 mA		0.15	-	0.35	
	I_C= 4000 mA,I_B= 1000 mA		-	-	0.8	
Base-Emitter Saturation Voltage	I_C= 2000 mA,I_B= 500 mA	$V_{BE(Sat)}$	-	-	1.6	V
Diode forward voltage	I_C= 2000 mA	V_{FEC}	-	-	2	V
Transition Frequency	V_{CE}= 10 V,I_C= 500 mA f= 1 MHz	f_T	5	-	-	MHz
Rise Time	I_C= 250 mA	tr	-	-	0.5	ns
Storage Time	I_C= 250 mA	ts	2	-	4	
Fall Time	I_C= 250 mA	tf	-	-	0.5	

Classification Of $H_{FE(2)}$

Range	20~30	30~40

Classification Of $t_{s(us)}$

Rank	A	B
Range	2~3	3~4

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Typical Characteristics Curves

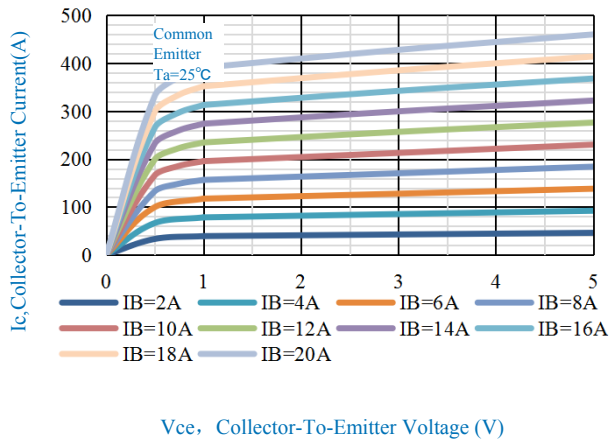


Fig.1-Static Characteritsics

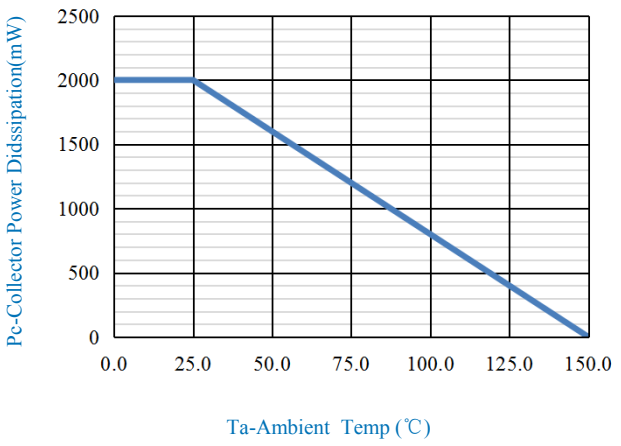


Fig.2-Collector Power Dissipation Vs. Ta

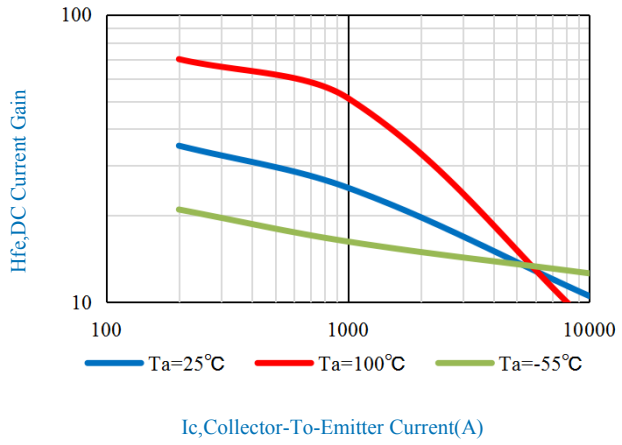


Fig.3-Dc Current Gain Vs. Collector Current

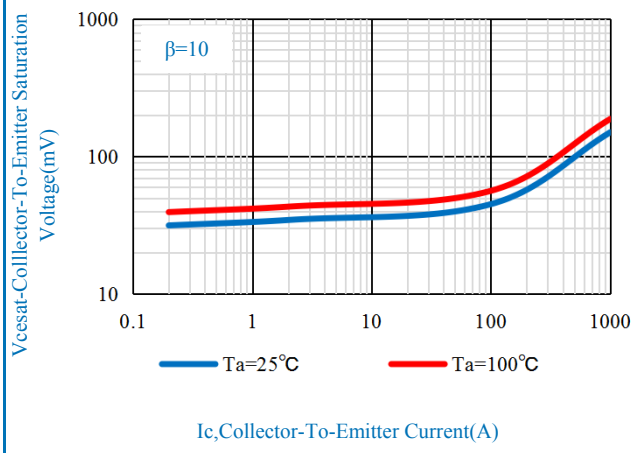


Fig.4-Base-To-Emitter Saturation Voltage Vs. Collector Current

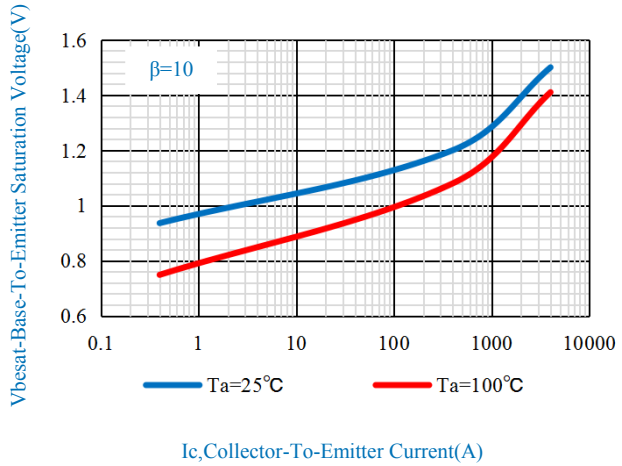


Fig.5-Base-To-Emitter Saturation Voltage Vs. Collector Current

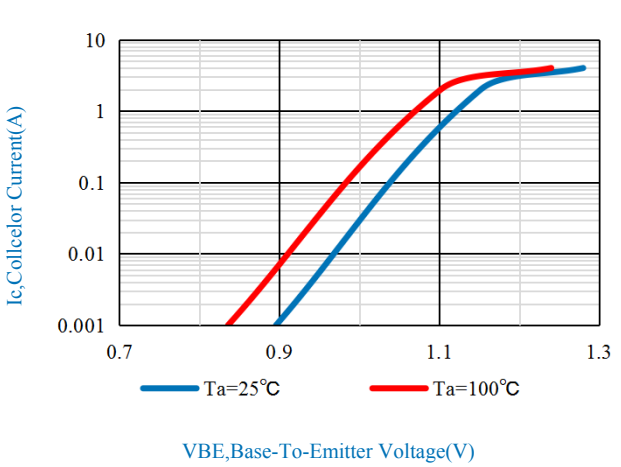


Fig.6-Base-To-Emitter Voltage Characteristics

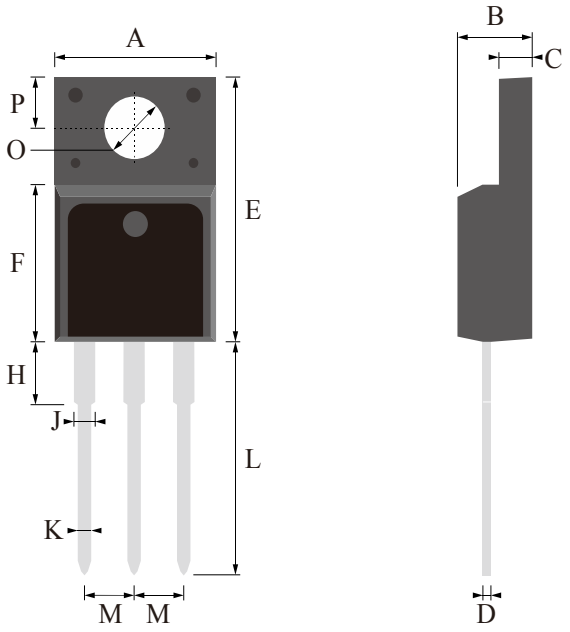
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OUTLINE DRAWINGS

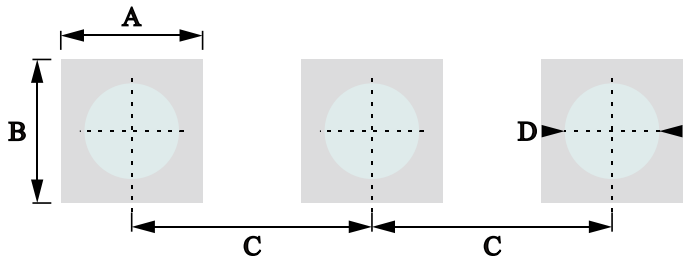
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OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.25	-	10.75	0.3642	-	0.4232
B	4.20	-	5.20	0.1654	-	0.2047
C	2.30	-	2.90	0.0906	-	0.1142
D	0.35	-	0.75	0.0138	-	0.0295
E	14.80	-	16.80	0.5827	-	0.6614
F	8.25	-	9.75	0.3248	-	0.3839
L	12.15	-	14.15	0.4783	-	0.5571
H	2.60	-	3.80	0.1024	-	0.1496
J	1.10	-	1.60	0.0433	-	0.0630
K	0.60	-	1.00	0.0236	-	0.0394
M	2.20	-	3.00	0.0866	-	0.1181
O	2.70	-	3.50	0.1063	-	0.1378
P	3.10	-	3.80	0.1220	-	0.1496

RECOMMEDNED LAYOUT DRAWINGS

TO-220F



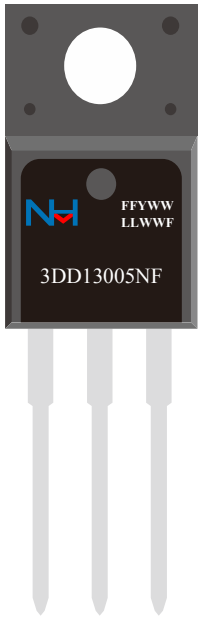
OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	1.60	-	-	0.0630	-
B	-	1.60	-	-	0.0630	-
C	-	2.54	-	-	0.1000	-
D	-	1.00	-	-	0.0394	-

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MARKING INFORMATION



MARKING INSTRUCTIONS

NH=Niuhang Trademark

FF=Product Line Code,According To Actual Changes

YWW=Date Code,According To Actual Changes

LLWWF=Inernal Code,According To Actual Changes

3DD13005NF=Model

PACKING INFORMATION

Package Type	Package Code	Productor Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
TO-220F	P1	2.048	Tube	50	1000	5000

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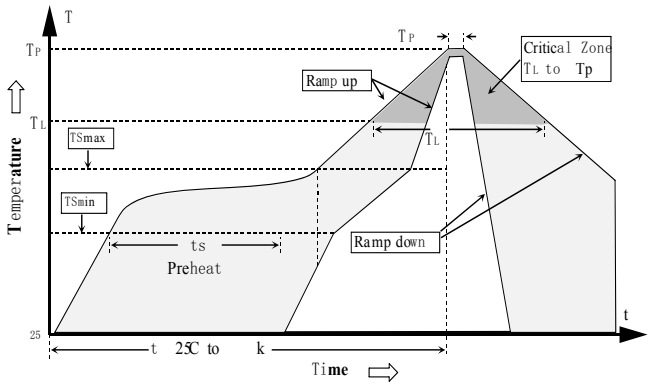
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Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat−Temperature Min (TS min) −Temperature Max (TS max) −Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(TP)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature (tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

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Specification Revision History

Rev.	Date	Changed Items	Pre-Changed Content	Changed Content
A/1	2014-10-20	First Issue		
		Blank Below		