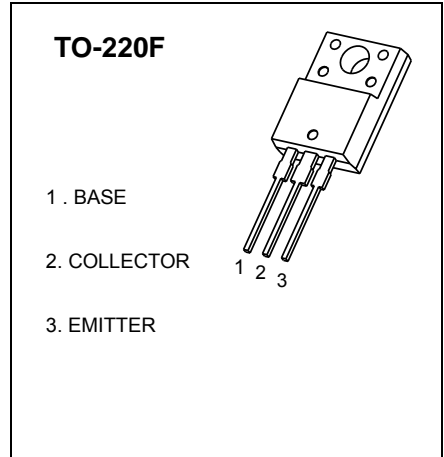


## TO-220F Plastic-Encapsulate Transistor

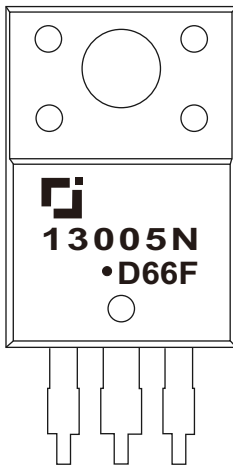
**3DD13005ND66F** TRANSISTOR (NPN)

### FEATURE

- Power switching applications
- Good high temperature
- Low saturation voltage
- High speed switching

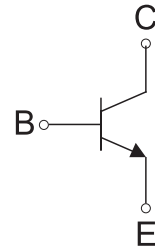


### MARKING



13005N=Device code  
Solid dot=Green moldinn compound device,  
if none,the normal device  
D66F=Code

### Equivalent Circuit



### MAXIMUM RATINGS (Ta=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>CB0</sub>	Collector-Base Voltage	700	V
V <sub>CEO</sub>	Collector-Emitter Voltage	420	V
V <sub>EBO</sub>	Emitter-Base Voltage	9	V
I <sub>C</sub>	Collector Current -Continuous	4	A
P <sub>C</sub>	Collector Power Dissipation	2	W
R <sub>θJA</sub>	Thermal Resistance from Junction to Ambient	62.5	°C/W
T <sub>J</sub> , T <sub>stg</sub>	Operation Junction and Storage Temperature Range	-55-150	°C

**ELECTRICAL CHARACTERISTICS (T<sub>a</sub>=25°C unless otherwise specified)**

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> = 1mA, I <sub>E</sub> =0	700			V
Collector-emitter breakdown voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> =0	420			V
Emitter-base breakdown voltage	V <sub>(BR)EBO</sub>	I <sub>E</sub> = 1mA, I <sub>C</sub> =0	9			V
Collector cut-off current	I <sub>CBO</sub>	V <sub>CB</sub> =700V, I <sub>E</sub> =0			100	μA
Collector cut-off current	I <sub>CEO</sub>	V <sub>CE</sub> =400V, I <sub>B</sub> =0			100	μA
Emitter cut-off current	I <sub>EBO</sub>	V <sub>EB</sub> =7V, I <sub>C</sub> =0			100	μA
DC current gain	h <sub>FE(1)</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =1A	10		40	
	h <sub>FE(2)</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =200mA	10		60	
	h <sub>FE(3)</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =10mA	5			
	h <sub>FE(4)</sub>	V <sub>CE</sub> =5V, I <sub>C</sub> =4A	8		40	
Collector-emitter saturation voltage	V <sub>CE(sat)(1)</sub>	I <sub>C</sub> =1A, I <sub>B</sub> =0.2A			0.3	V
	V <sub>CE(sat)(2)</sub>	I <sub>C</sub> =2A, I <sub>B</sub> =0.4A	0.15		0.35	V
	V <sub>CE(sat)(3)</sub>	I <sub>C</sub> =4A, I <sub>B</sub> =1A			0.8	V
Base-emitter saturation voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> =2A, I <sub>B</sub> =0.5A			1.6	V
Diode forward voltage	V <sub>FEC</sub>	I <sub>C</sub> =2A			2	V
Transition frequency	f <sub>T</sub>	V <sub>CE</sub> =10V, I <sub>C</sub> =0.5A, f=1MHz	5			MHz
Rise time	t <sub>r</sub>	I <sub>C</sub> =250mA			0.5	μs
Storage time	t <sub>s</sub>	I <sub>C</sub> =250mA	2.0		4.0	
Fall time	t <sub>f</sub>	I <sub>C</sub> =250mA			0.5	

**CLASSIFICATION of h<sub>FE(2)</sub>**

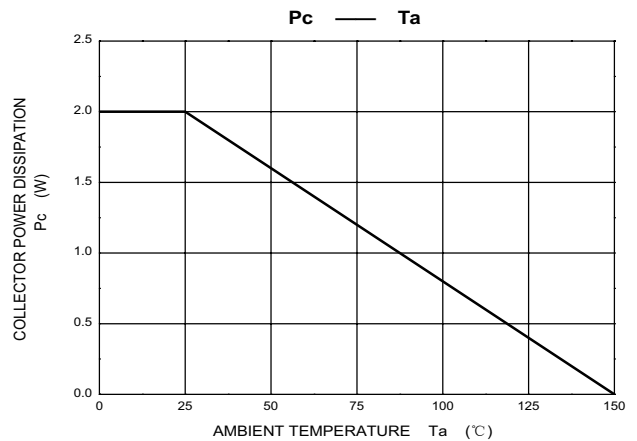
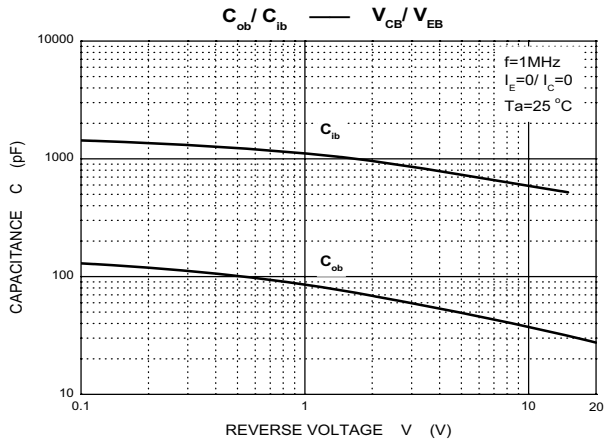
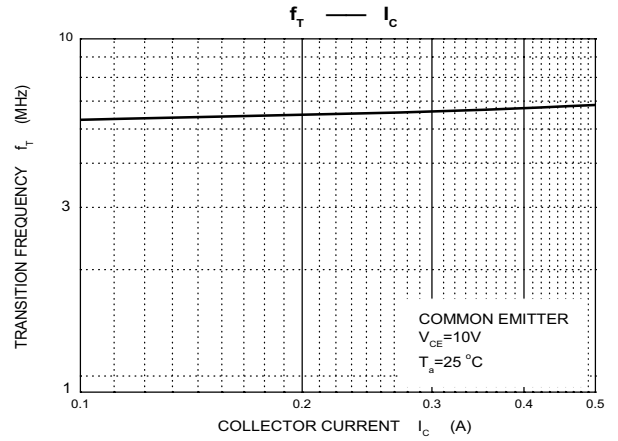
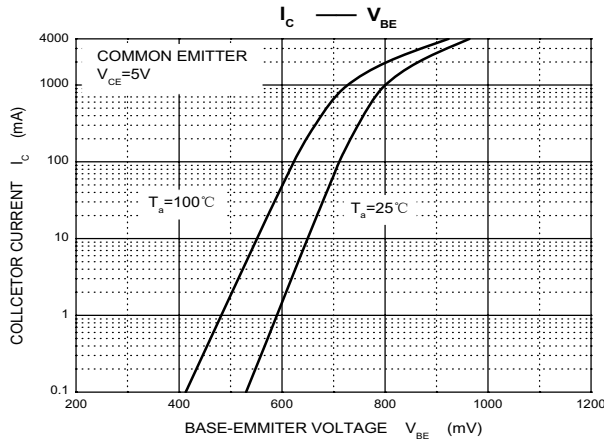
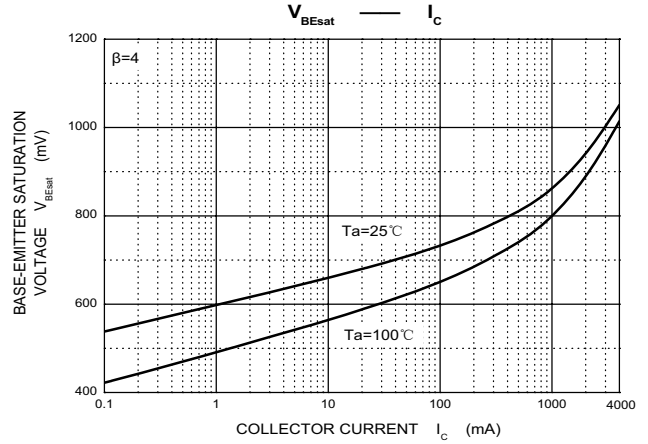
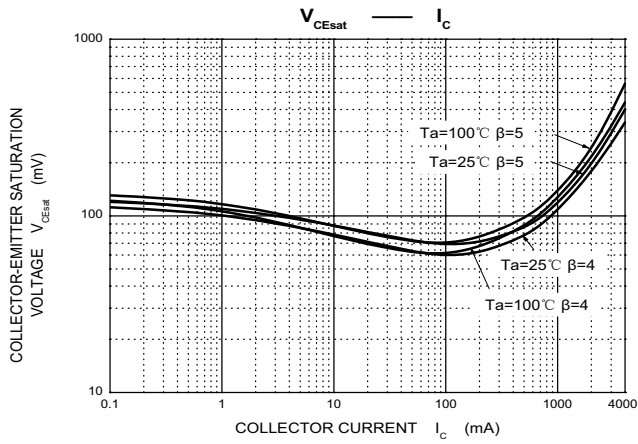
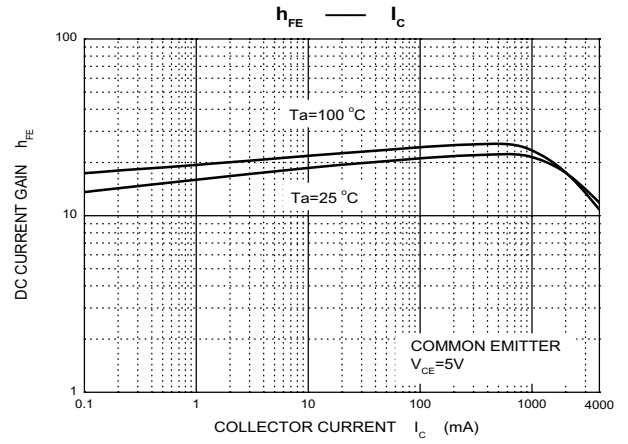
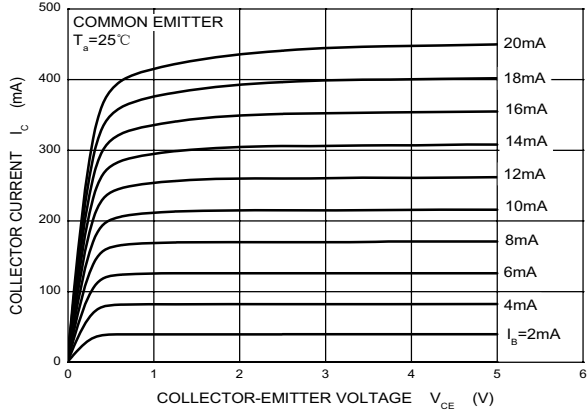
Range	20~30	30~40

**CLASSIFICATION of t<sub>s</sub>(μs)**

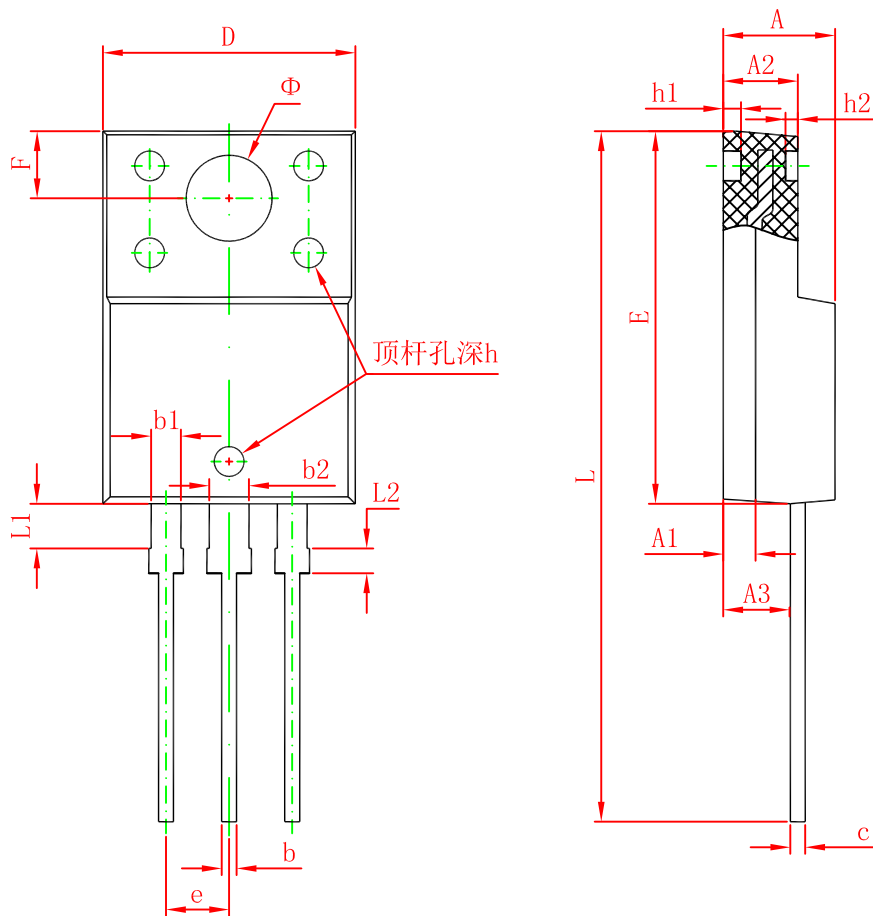
Rank	A	B
Range	2.0-3.0	3.0-4.0

# Typical Characteristics

Static Characteristic



# TO-220F Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300 REF.		0.051 REF.	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP.		0.100 TYP.	
F	2.700 REF.		0.106 REF.	
Φ	3.500 REF.		0.138 REF.	
h	0.000	0.300	0.000	0.012
h1	0.800 REF.		0.031 REF.	
h2	0.500 REF.		0.020 REF.	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	0.900	1.100	0.035	0.043