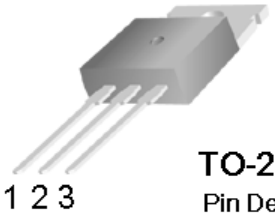
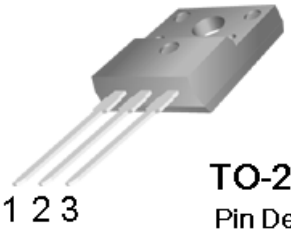
High Voltage NPN Power Transistor



TO-220
Pin Definition
1. Base
2. Collector
3. Emitter



TO-220F
Pin Definition
1. Base
2. Collector
3. Emitter

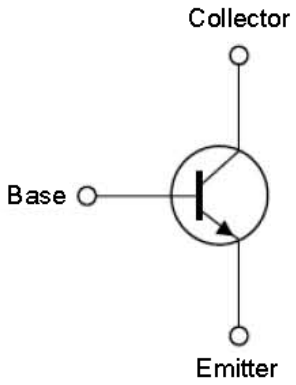
Features

- High Voltage
- High Switch Speed
- BV_{CEO} : 400V
- BV_{CBO} : 700V
- I_C : 4A
- $V_{CE(SAT)}$: 1.3V @ I_C / I_B = 2.5A / 0.6A

Application

- Electronic Ballasts
- Adapter
- Lighting

INTERNAL SCHMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25℃)

Parameter	Symbol	Max rating	Unit
Collector-Base Voltage	VCBO	700	V
Collector-Emitter Voltage	VCEO	400	V
Emitter-Base Voltage	VEBO	9	V
Collector Current (DC)	I_C	4	A
Collector Current (Pulse)		8	
Base Current (DC)	I_B	2	A
Base Current (Pulse)		4	
Total Power Dissipation (TO-220)	P_{Btot}	75	W
Total Power Dissipation (TO-220F)		30	
Junction Temperature	T_J	+150	℃
Operating Junction and Storage Temperature Range	T_{STG}	-55 ~ +150	℃

Note: Single Pulse. Pw=300uS, Duty≦ 2%

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Collector-Base Voltage	BVCBO	IC = 1mA, IB=0	700	–	–	V
Collector-Emitter Breakdown Voltage	BVCEO	IC = 10mA, IE=0	400	–	–	V
Emitter- Base Breakdown Voltage	BVEBO	IE = 0.1mA, IC=0	9	–	–	V
Collector Cutoff Current	ICEO	VCE = 400V, IE=0	–	–	250	uA
Collector Cutoff Current	ICBO	VCB = 700V, IE=0	–	–	1	mA
Emitter Cutoff Current	IEBO	VEB = 9V, IC=0	–	–	1	mA
DC Current Gain	hFE1	VCE = 5V, IC=10mA	15	–	32	V
	hFE2	VCE = 5V, IC=2.5A	8	–	28	
Collector-Emitter Saturation Voltage	VCE(SAT1)	IC = 0.8A, IB =0.1A	–	–	1.1	V
	VCE(SAT2)	IC = 2.5A, IB =0.6A	–	–	1.3	
Base-Emitter Saturation Voltage	VBE(SAT1)	IC = 1A, IB =0.2A	–	–	1.2	V
	VBE(SAT2)	IC = 2.5A, IB =0.5A	–	–	1.3	
Turn On Time	t_{on}	Vcc = 125V, Ic = 2A, IB1=1B2=0.4A, tp=25uS Duty Cycle ≦ 1%	–	0.2	0.5	uS
Storage Time	t_{STG}		–	2.2	3	uS
Fall Time	t_f		–	0.2	0.5	uS

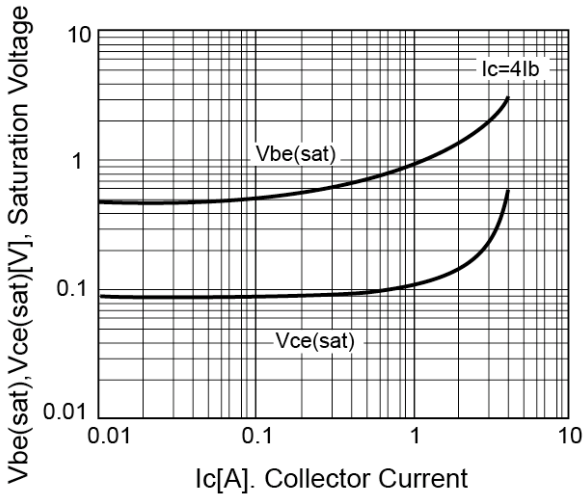
Dynamic

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Frequency	f_T	VCE = 10V, IC=0.5A	4	–	–	MHz
Output Capacitance	Cob	VCB = 10V, f=0.1MHz	–	65	–	pF

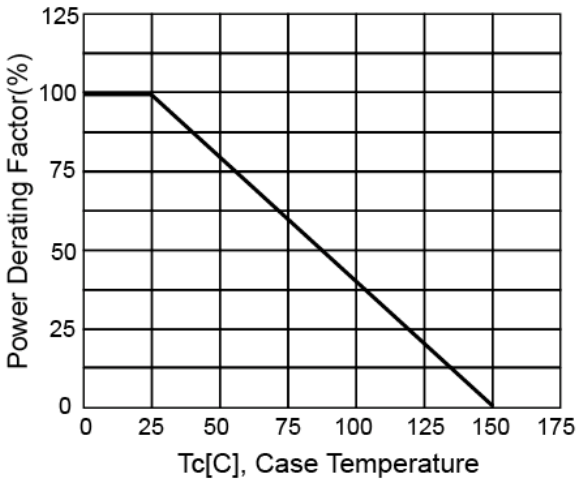
Note: Pulse test: pulse width ≦ 300uS, duty cycle ≦ 2%

Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

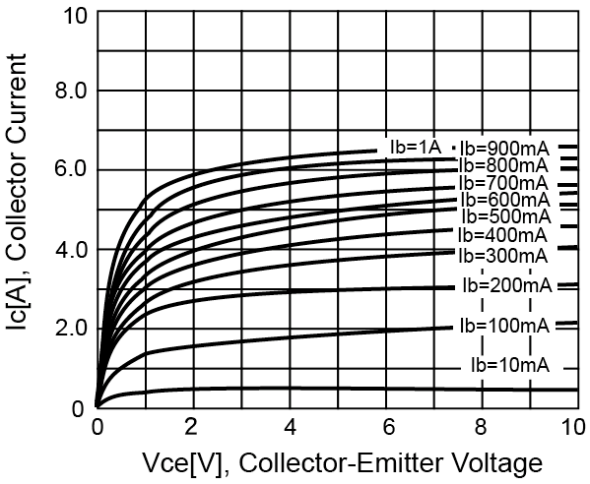
$V_{CE(SAT)}$ v.s. $V_{BE(SAT}$



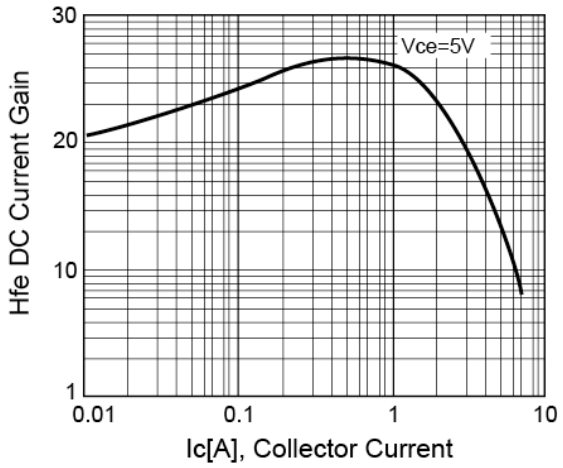
Power Derating



Static Characteristics



DC Current Gain



Reverse Bias SOA

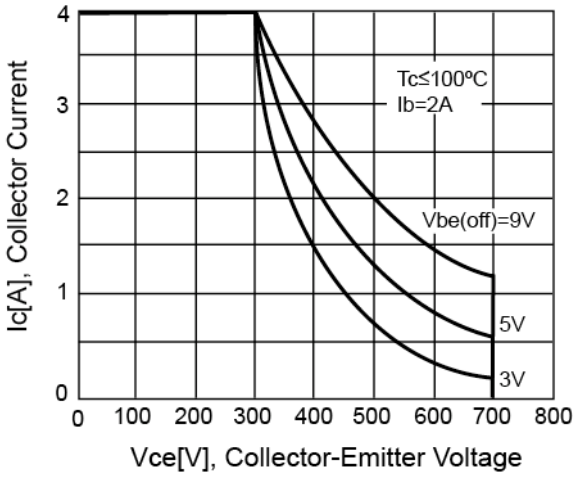
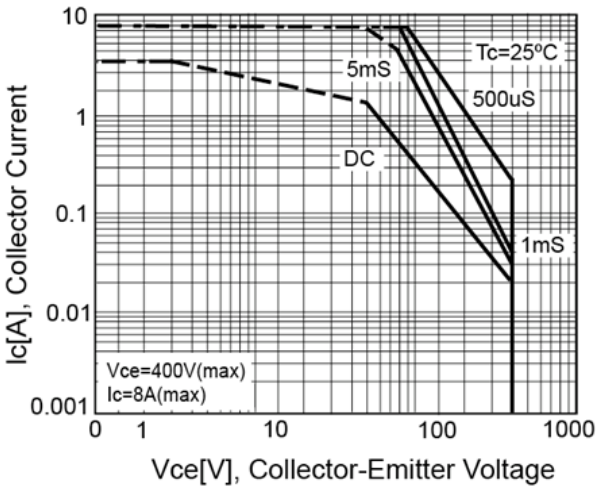


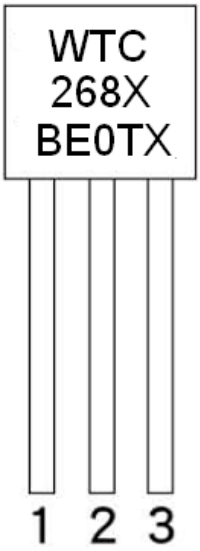
Figure 6. Safety Operating Area



Ordering Information

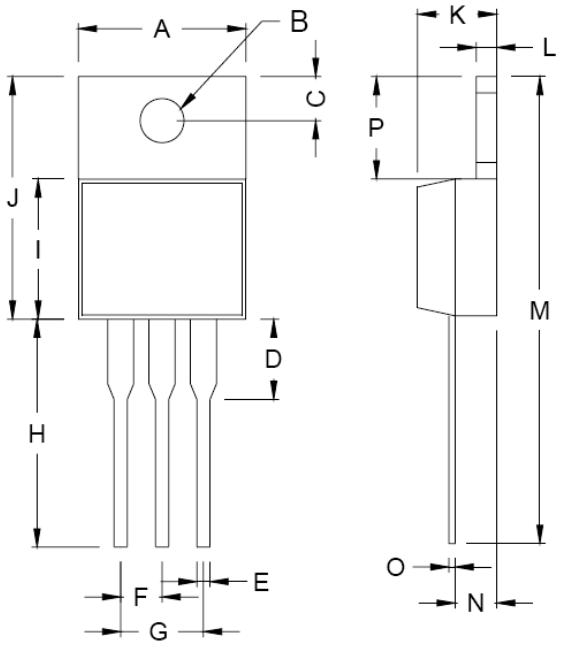
Type NO	Marking	Package Code
WTX268	268X	TO-220

Marking and Pin Define



First Line	WTC	Company Name	
Second Line	268X	Product Code	
Third Line	B E 0 T X	1st (Year Code)	A-2010 B-2011 C-2012 ...
		2nd (Month Code)	A-Jan, B-Feb, C-Mar, D-Apr, E-May, F-Jun, G-Jul, H-Aug, I-Sep, J-Oct, K-Nov, L-Dec
		3rd (Lot Code)	0~1 , A~9
		4th (Product Code)	M - MOS , T - Transistor
		5th (Package Code)	I - TO251, D - TO252 , L - TO92, M - TO126, X - TO220, F - TO220F
		6th (Spec Code)	(Reserve)

TO-220 Package Dimension

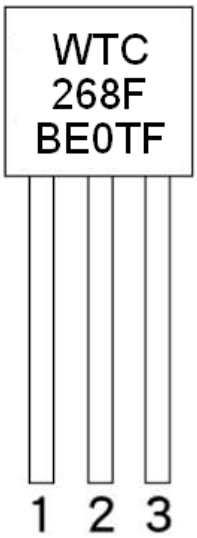


TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.000	10.500	0.394	0.413
B	3.740	3.910	0.147	0.154
C	2.440	2.940	0.096	0.116
D	-	6.350	-	0.250
E	0.75	0.85	0.029	0.033
F	2.345	2.715	0.092	0.058
G	4.690	5.430	0.092	0.107
H	12.700	14.732	0.500	0.581
J	14.224	16.510	0.560	0.650
K	3.556	4.826	0.140	0.190
L	1.285	1.315	0.050	0.051
M	27.700	29.620	1.060	1.230
N	2.032	2.921	0.080	0.115
O	0.255	0.610	0.010	0.024
P	5.842	6.858	0.230	0.270

Ordering Information

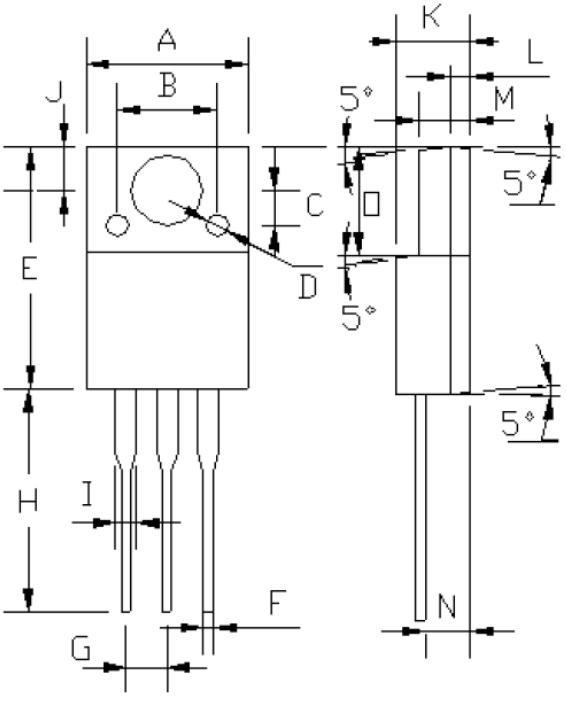
Type NO	Marking	Package Code
WTF268	268F	TO-220F

Marking and Pin Define



First Line	WTC	Company Name	
Second Line	268F	Product Code	
Third Line	B E 0 T F	1st (Year Code)	A-2010 B-2011 C-2012 ...
		2nd (Month Code)	A-Jan, B-Feb, C-Mar, D-Apr, E-May, F-Jun, G-Jul, H-Aug, I-Sep, J-Oct, K-Nov, L-Dec
		3rd (Lot Code)	0~1 , A~9
		4th (Product Code)	M - MOS , T - Transistor
		5th (Package Code)	I - TO251, D - TO252 , L - TO92, M - TO126, X - TO220, F - TO220F
		6th (Spec Code)	(Reserve)

TO-220F Package Dimension



220F DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.96	10.36	0.392	0.407
B	6.20 (typ.)		0.244 (typ.)	
C	2.20 (typ.)		0.087 (typ.)	
D	1.40 (typ.)		0.055 (typ.)	
E	15.07	16.07	0.593	0.632
F	0.80 (typ.)		0.031 (typ.)	
G	2.44	2.64	0.096	0.104
H	13.08	13.48	0.514	0.530
I	1.47 (max.)		0.057 (max.)	
J	3.20	3.40	0.125	0.133
K	4.60	4.80	0.181	0.188
L	1.15 (typ.)		0.045 (typ.)	
M	2.44	2.64	0.096	0.104
N	2.60	2.80	0.102	0.110
O	6.55	6.65	0.258	0.262