TO-220

RoHS COMPLIANT

1 2 3

Equivalent Circuit

C ○ (2)

B ○ (1)

E ○ (3)

1.Base 2.Collector 3.Emitter
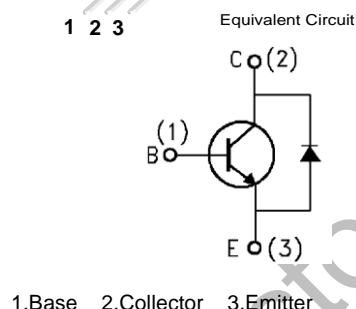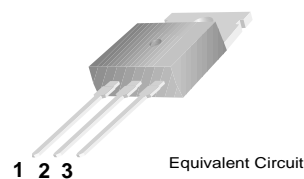
WGD13005

Features

- Wide Safe Operating Area
- Built-in Free Wheeling diode
- Suitable for Electronic Ballast Application
- Small Variance in Storage Time

Absolute Maximum Ratings* $T = 25°C$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{CBO}	Collector-Base Voltage	700	V
V_{CEO}	Collector-Emitter Voltage	400	V
V_{EBO}	Emitter-Base Voltage	9	V
I_C	Collector Current (DC)	4	A
I_{CP}	Collector Current (Pulse)	8	A
I_B	Base Current	2	A
P_C	Collector Dissipation ($T_C = 25°C$)	70	W
T_J	Junction Temperature	150	°C
T_{STG}	Storage Temperature	-65 ~ 150	°C

Electrical Characteristics $T_C = 25°C$ unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = 1mA, I_E = 0$	700			V
BV_{CEO}	Collector-Emitter Breakdown Voltage	$I_C = 5mA, I_B = 0$	400			V
BV_{EBO}	Emitter-Base Breakdown Voltage	$I_E = 1mA, I_C = 0$	9			V
I_{CES}	Collector Cut-off Current	$V_{CE} = 700V, V_{EB} = 0$			100	mA
I_{CEO}	Collector Cut-off Current	$V_{CE} = 400V, IB = 0$			250	mA
I_{EBO}	Emitter Cut-off Current	$V_{EB} = 12V, I_C = 0$			100	mA
h_{FE}	DC Current Gain	$V_{CE} = 5V, I_C = 10mA$ $V_{CE} = 5V, I_C = 2A$	10 8		 40	
$V_{CE}(sat)$	Collector-Emitter Saturation Voltage	$I_C = 0.5A, I_B = 0.1A$ $I_C = 1A, I_B = 0.2A$ $I_C = 2.5A, I_B = 0.5A$			0.7 1.0 1.5	V
$V_{BE}(sat)$	Base-Emitter Saturation Voltage	$I_C = 0.5A, I_B = 0.1A$ $I_C = 1A, I_B = 0.2A$ $I_C = 2.5A, I_B = 0.5A$			1.1 1.2 1.3	V
V_f	Internal Diode Forward Voltage Drop	$I_F = 2A$			2.5	V

* Pulse Test: PW ≤ 300μs, Duty Cycle ≤ 2%

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{θJC}$	Thermal Resistance, Junction to Case	1.78	°C/W
$R_{θJA}$	Thermal Resistance, Junction to Ambient	62.5	°C/W

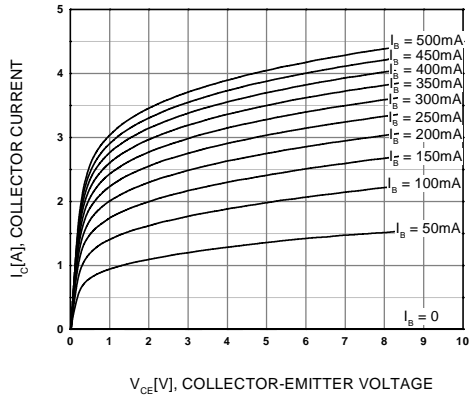## Typical Performance Characteristics
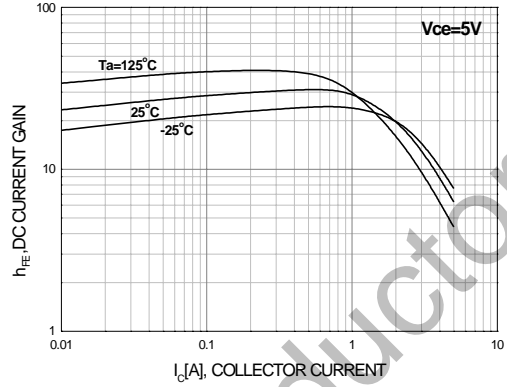

Figure 1. Static Characteristic
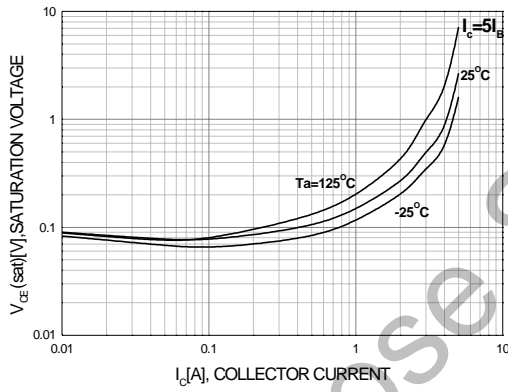

Figure 2. DC Current Gain

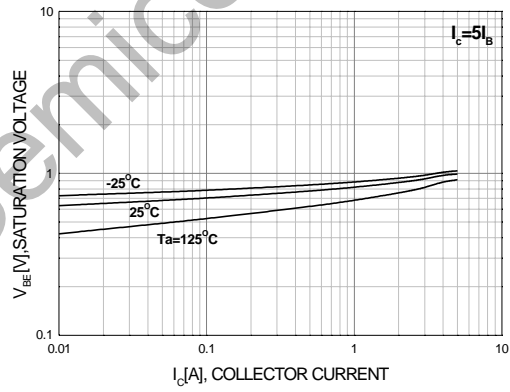**Figure 3. Collector-Emitter Saturation Voltage**

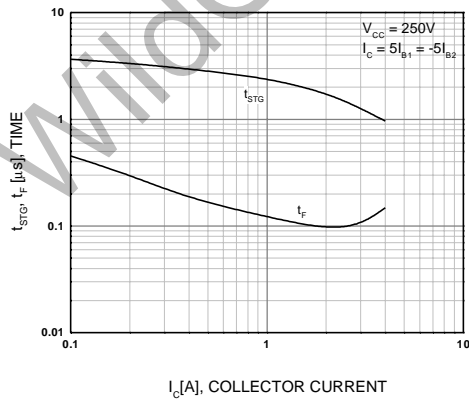**Figure 4. Base-Emitter Saturation Voltage**

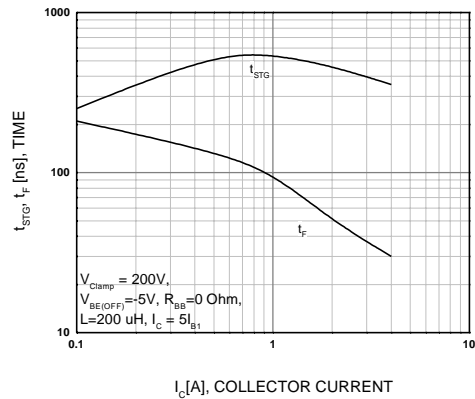**Figure 5. Resitive Load Switching Time**

Figure 6. Inductive Load Switching Time

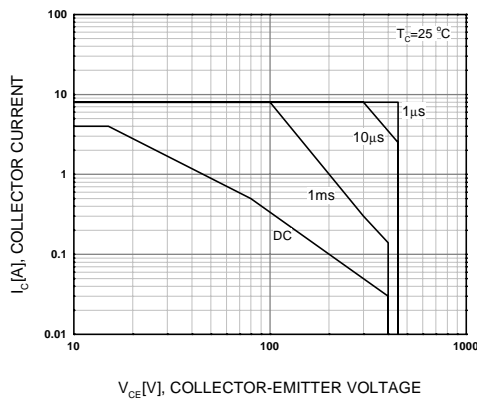## Typical Performance Characteristics
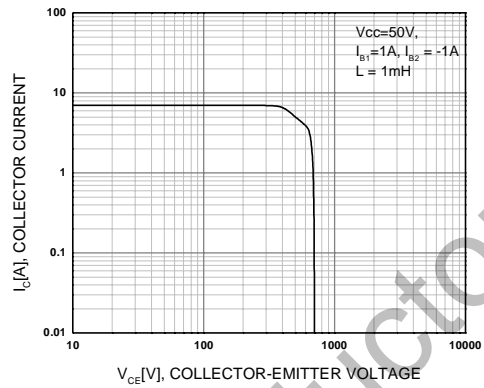

Figure 7. Forward Bias Safe Operating Area
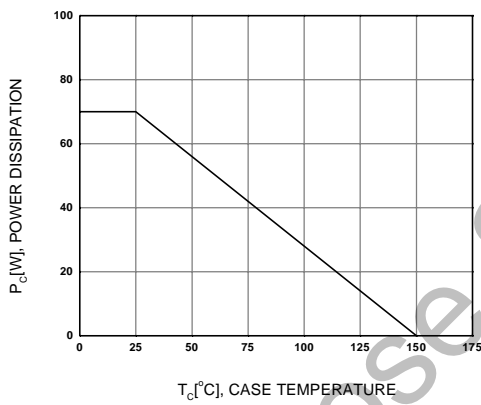

Figure 8. Reverse Bias Safe Operating Area

Figure 9. Power Derating

Package Dimension

TO-220

Unit:mm

(A型) (B型)

Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.66	10.28	W5	9.80	10.20	L4**	6.20	6.60	T3	0.45	0.60
W1	2.54（TYP）		L	9.00	9.40	L5	2.79	3.30	G(Φ)	3.50	3.70
W2	0.70	0.95	L1	6.40	6.80	T	4.30	4.70			
W3	1.17	1.37	L2	2.70	2.90	T1	1.15	1.40	Dimensions in Millimeters		
W4*	1.32	1.72	L3	12.70	14.27	T2	2.20	2.60			

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