

■ PRODUCT CHARACTERISTICS

BVCBO	700V
BVCEO	400V
HFE@5V2A	8-40
IC	4A

■ FEATURES

- * $V_{CEO(SUS)} = 400\text{ V}$
- * Reverse bias SOA with inductive loads @ $T_C = 100^\circ\text{C}$
- * Inductive switching matrix 2 to 4 Amp, 25 and 100°C
 t_C @ 3A, 100°C is 180 ns (Typ)
- * 700V blocking capability
- * SOA and switching applications information

■ APPLICATIONS

- * Switching regulator's, inverters
- * Motor controls
- * Solenoid/Relay drivers
- * Deflection circuits

■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	RST13005F	TO-220F	50 pieces/Tube
N/A	RST13005A	TO-220	50 pieces/Tube

■ ABSOLUTE MAXIMUM RATINGS

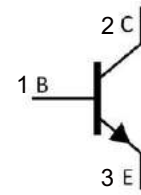
PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		$V_{CEO(SUS)}$	400	V
Collector-Emitter Voltage ($V_{BE}=0$)		V_{CES}	700	V
Collector-Base Voltage		V_{CBO}	700	V
Emitter Base Voltage		V_{EBO}	9	V
Collector Current	Continuous	I_C	4	A
	Peak (1)	I_{CM}	8	A
Base Current	Continuous	I_B	2	A
	Peak (1)	I_{BM}	4	A
Emitter Current	Continuous	I_E	6	A
	Peak (1)	I_{EM}	12	A
Power Dissipation at $T_C=25^\circ\text{C}$	TO-220F	P_D	40	W
	TO-220		75	
Derate above 25°C	TO-220F		320	mW/ $^\circ\text{C}$
	TO-220		600	
Operating and Storage Junction Temperature		T_J, T_{STG}	-65 ~ +150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C/W}$
Junction to Case	TO-220/TO-220F	θ_{JC}	1.67	$^\circ\text{C/W}$

Symbol



■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note 1)						
Collector-Emitter Sustaining Voltage	V _{CEO(SUS)}	I _C =10mA , I _B =0	400			V
Collector Cutoff Current	I _{CBO}	V _{CBO} =Rated Value, V _{BE(OFF)} =1.5V			1	mA
		V _{CBO} =Rated Value, V _{BE(OFF)} =1.5V, T _C =100°C			5	
Emitter Cutoff Current	I _{EBO}	V _{EB} =9V, I _C =0			1	mA
SECOND BREAKDOWN						
Second Breakdown Collector Current with bass forward biased	I _{S/B}				See Fig. 11	
Clamped Inductive SOA with Base Reverse Biased	RBSOA				See Fig. 12	
ON CHARACTERISTICS (Note 1)						
DC Current Gain	h _{FE1}	I _C =0.5A, V _{CE} =5V	20		40	
	h _{FE2}	I _C =1A, V _{CE} =5V	10		60	
	h _{FE3}	I _C =2A, V _{CE} =5V	8		40	
Collector-Emitter Saturation Voltage	V _{CE(SAT)}	I _C =1A, I _B =0.2A			0.5	V
		I _C =2A, I _B =0.5A			0.6	V
		I _C =4A, I _B =1A			1	V
		I _C =2A, I _B =0.5A, Ta=100°C			1	V
Base-Emitter Saturation Voltage	V _{BE (SAT)}	I _C =1A, I _B =0.2A			1.2	V
		I _C =2A, I _B =0.5A			1.6	V
		I _C =2A, I _B =0.5A, T _C =100°C			1.5	V
DYNAMIC CHARACTERISTICS						
Current-Gain-Bandwidth Product	f _T	I _C =500mA, V _{CE} =10V, f=1MHz	4			MHz
Output Capacitance	C _{OB}	V _{CB} =10V, I _E =0, f=0.1MHz		65		pF
SWITCHING CHARACTERISTICS						
Resistive Load (Table 1)						
Delay Time	t _D	V _{CC} =125V, I _C =2A, I _{B1} =I _{B2} =0.4A, t _p =25μs, Duty Cycle≤1%		0.025	0.1	μs
Rise Time	t _R			0.3	0.7	μs
Storage Time	t _S			1.7	4	μs
Fall Time	t _F			0.4	0.9	μs

Note: 1. Pulse Test: Pulse Width=5ms, Duty Cycles $\leq 10\%$

2. Pulse Test: $P_W=300\mu\text{s}$, Duty Cycles $\leq 2\%$

RESISTIVE SWITCHING PERFORMANCE

Fig. 1 Turn-On Time

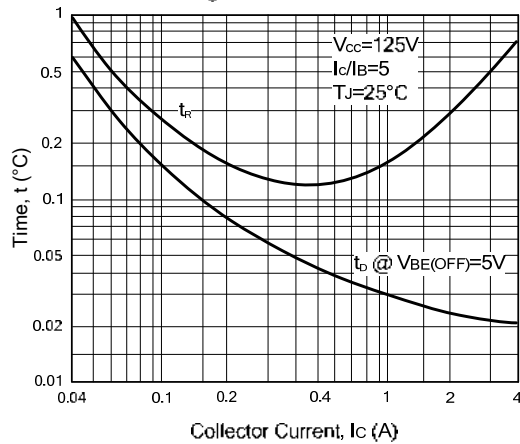


Fig. 2 Turn-Off Time

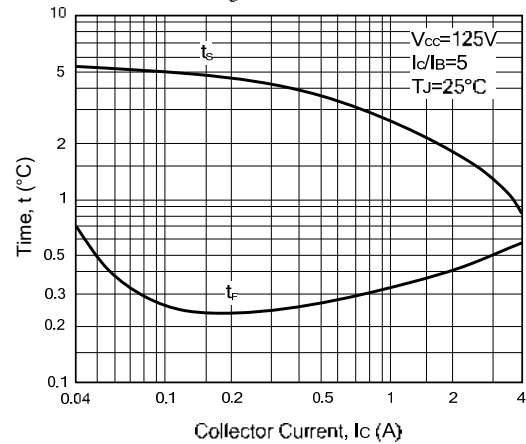


Fig. 3 Typical Thermal Response [$Z_{\theta JC}(t)$]

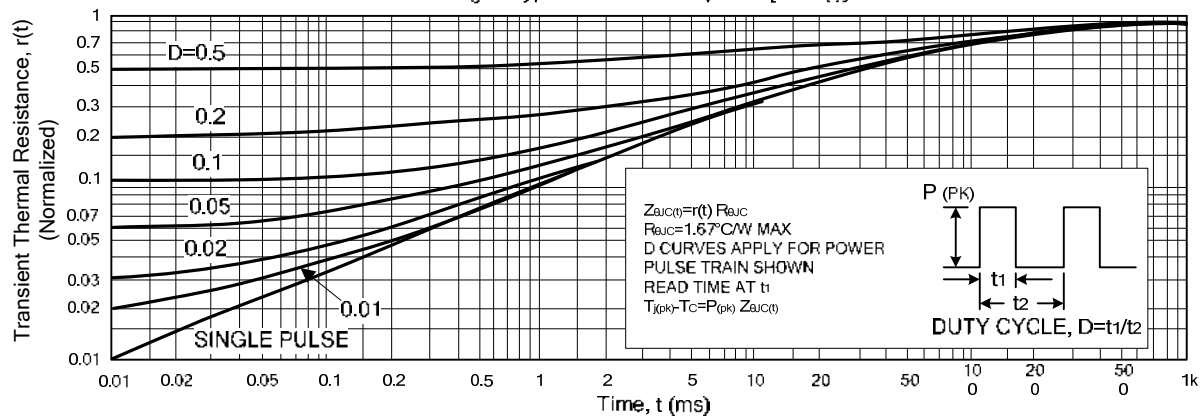


Fig. 4 Forward Bias Safe Operating Area

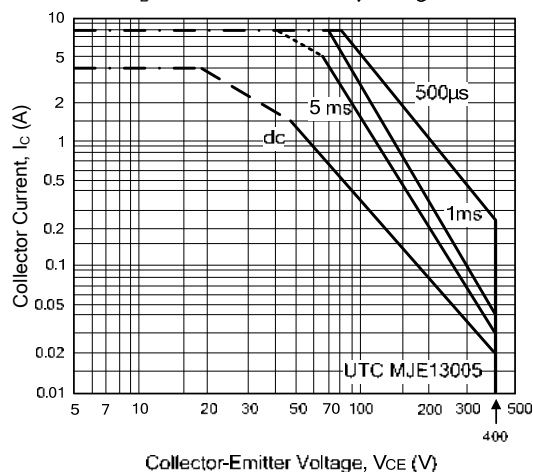
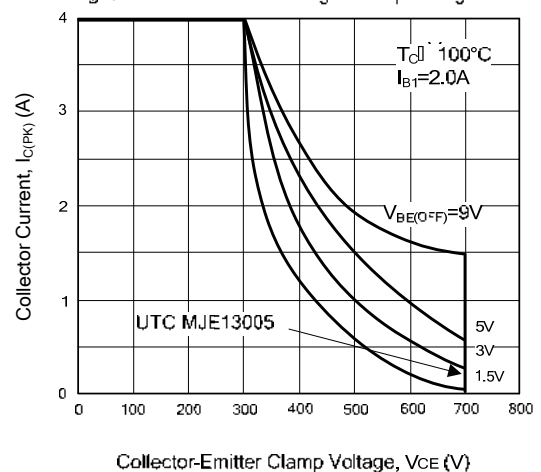
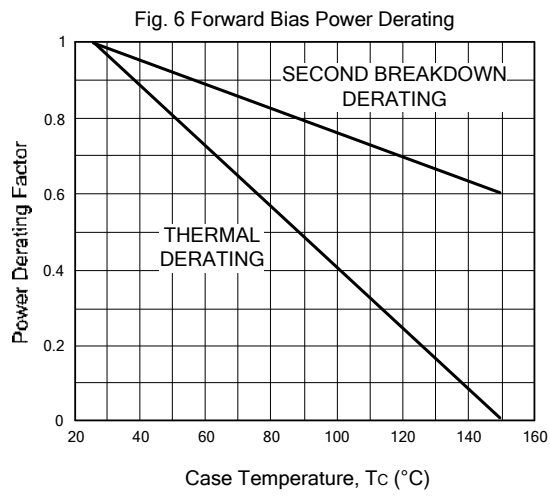


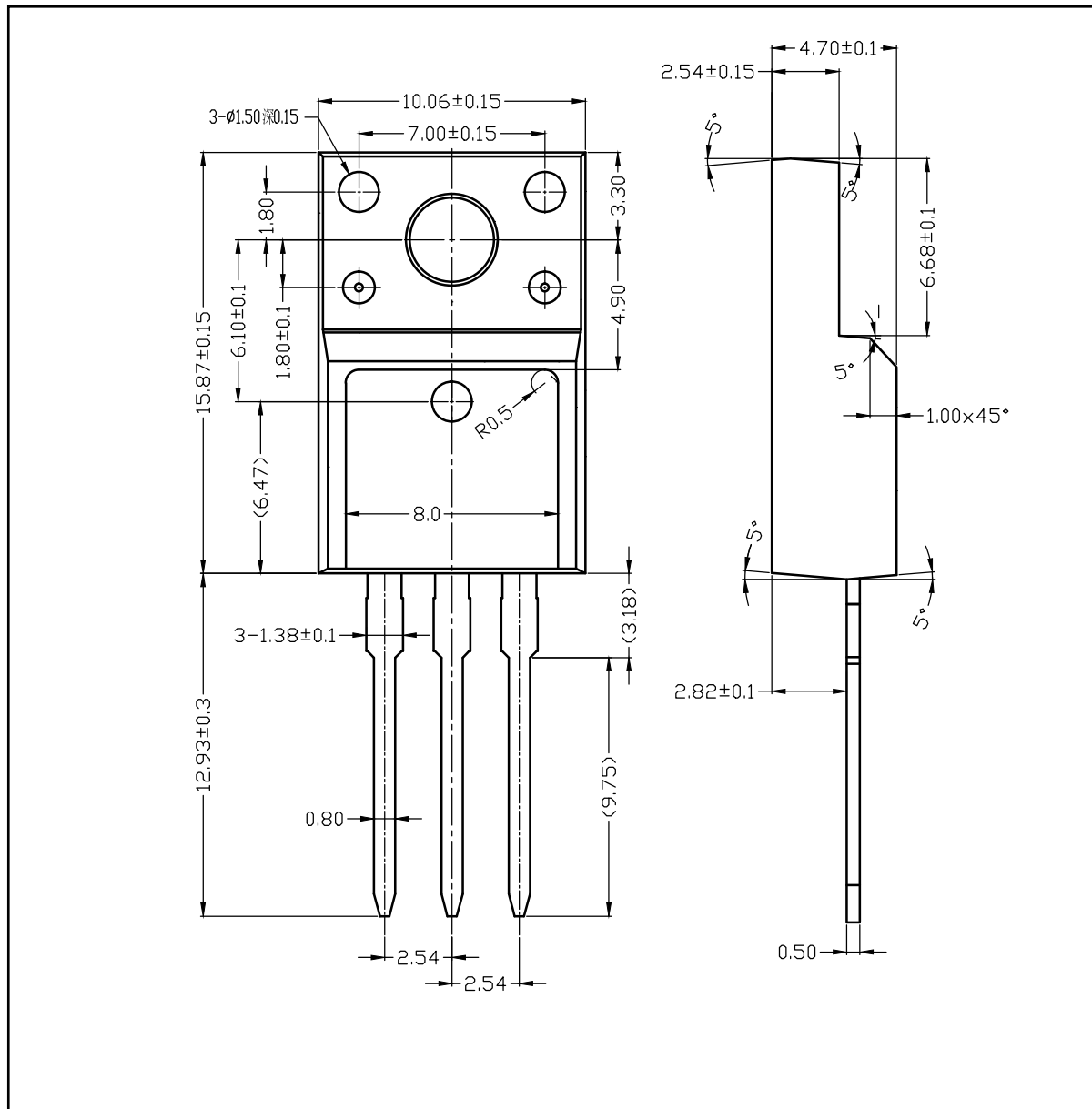
Fig. 5 Reverse Bias Switching Safe Operating Area



■ RESISTIVE SWITCHING PERFORMANCE(Cont.)



■ TO-220F-3L PACKAGE OUTLINE DIMENSIONS



■ TO-220-3L PACKAGE OUTLINE DIMENSIONS

