

■ PRODUCT CHARACTERISTICS

BVCBO	700V
BVCEO	400V
HFE@5V2A	8-40
IC	12A

■ APPLICATIONS

- Fluorescent lamp
- Electronic ballast
- Electronic transformer
- Switch mode power supply

■ FEATURES

- * $V_{CEQ(SUS)}$ 400V
- * 700V Blocking Capability

Symbol



■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	RST13009DQ	TO-3PB	30 pieces/Tube

■ ABSOLUTE MAXIMUM RATING

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		V _{CEO}	400	V
Collector-Emitter Voltage (V _{BE} =-1.5V)		V _{CEV}	700	V
Emitter Base Voltage		V _{EBO}	9	V
Collector Current	Continuous	I _C	12	A
	Peak	I _{CM}	24	A
Base Current	Continuous	I _B	6	A
	Peak	I _{BM}	12	A
Emitter Current	Continuous	I _E	18	A
	Peak	I _{EM}	36	A
Power Dissipation		P _D	80	W
Derate above 25℃			640	mW/℃
Junction Temperature		T _J	+150	℃
Storage Temperature		T _{STG}	-40 ~ +150	℃

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	21	°C/W
Junction to Case	θ_{JC}	1.55	°C/W

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note)						
Collector- Emitter Sustaining Voltage	V_{CEO}	$I_C = 10\text{mA}$, $I_B = 0$	400	-	-	V
Collector Cutoff Current	I_{CEV}	$V_{BE(OFF)} = 1.5V_{DC}$	-	-	1	mA
V_{CBO} =Rated Value		$V_{BE(OFF)} = 1.5V_{DC}$, $T_C = 100^{\circ}\text{C}$	-	-	5	
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 9V_{DC}$, $I_C = 0$	-	-	1	mA
ON CHARACTERISTICS (Note)						
DC Current Gain	h_{FE1}	$I_C = 5\text{A}$, $V_{CE} = 5\text{V}$	-	-	40	
	$h_{FE\ 2}$	$I_C = 8\text{A}$, $V_{CE} = 5\text{V}$	-	-	30	
Current-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = 5\text{A}$, $I_B = 1\text{A}$	-	-	1	V
		$I_C = 8\text{A}$, $I_B = 1.6\text{A}$	-	-	1.5	V
		$I_C = 12\text{A}$, $I_B = 3\text{A}$	-	-	3	V
		$I_C = 8\text{A}$, $I_B = 1.6\text{A}$, $T_C = 100^{\circ}\text{C}$	-	-	2	V
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	$I_C = 5\text{A}$, $I_B = 1\text{A}$	-	-	1.2	V
		$I_C = 8\text{A}$, $I_B = 1.6\text{A}$	-	-	1.6	V
		$I_C = 8\text{A}$, $I_B = 1.6\text{A}$, $T_C = 100^{\circ}\text{C}$	-	-	1.5	V
DYNAMIC CHARACTERISTICS						
Transition frequency	f_T	$I_C = 500\text{mA}$, $V_{CE} = 10\text{V}$, $f = 1\text{MHz}$	4	-	-	MHz
Output Capacitance	C_{OB}	$V_{CB} = 10\text{V}$, $I_E = 0$, $f = 0.1\text{MHz}$	-	180	-	pF
SWITCHING CHARACTERISTICS (Resistive Load, Table 1)						
Delay Time	t_{DLY}	$V_{CC} = 125\text{Vdc}$, $I_C = 8\text{A}$ $I_{B1} = I_{B2} = 1.6\text{A}$, $t_P = 25\mu\text{s}$ Duty Cycle $\leq 1\%$	-	0.06	0.1	μs
Rise Time	t_R		-	0.45	1	μs
Storage Time	t_S		-	1.3	3	μs
Fall Time	t_F		-	0.2	0.7	μs
Inductive Load, Clamped (Table 1, Fig. 13)						
Voltage Storage Time	t_S	$I_C=8\text{A}$, $V_{CLAMP}=300\text{V}$, $I_{B1}=1.6\text{A}$	-	0.92	2.3	μs
Crossover Time	t_C	$V_{BE(OFF)} = 5\text{V}$, $T_C = 100^{\circ}\text{C}$	-	0.12	0.7	μs

Note: Pulse Test: Pulse Width = 300 μs , Duty Cycle = 2%

■ TYPICAL CHARACTERISTICS

Fig. 1 Forward Bias Safe Operating Area

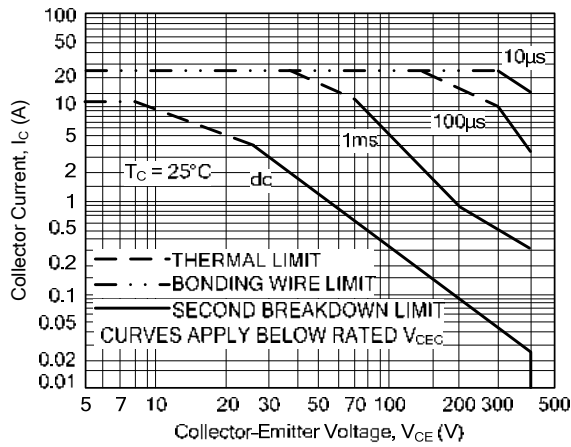


Fig. 2 Reverse Bias Switching Safe Operating Area

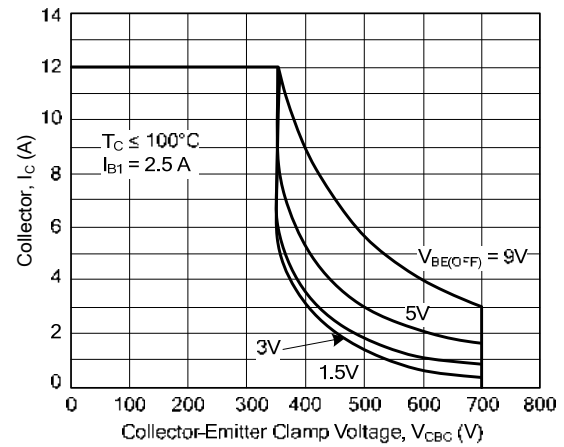


Fig. 3 Forward Bias Power Derating

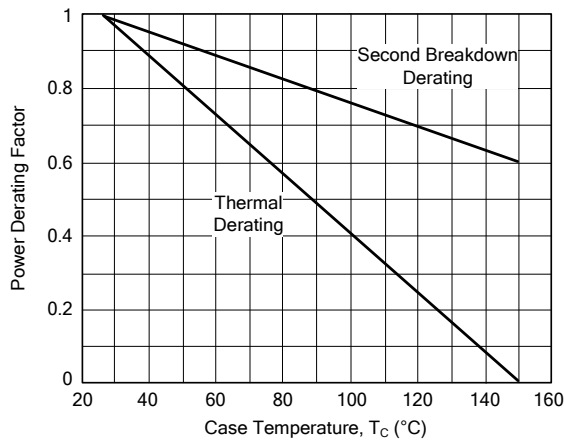
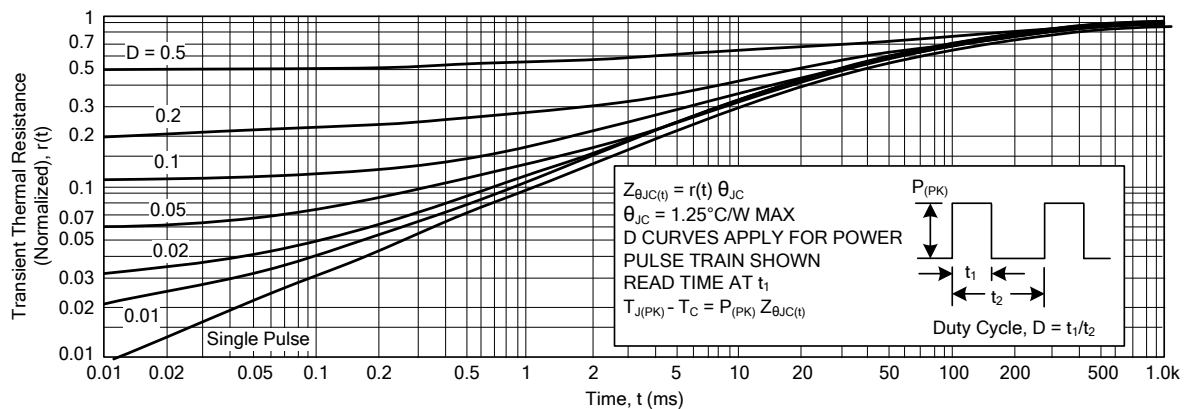


Fig. 4 Typical Thermal Response [$Z_{\theta JC}(t)$]



■ TYPICAL CHARACTERISTICS(Cont.)

Fig. 5 DC Current Gain

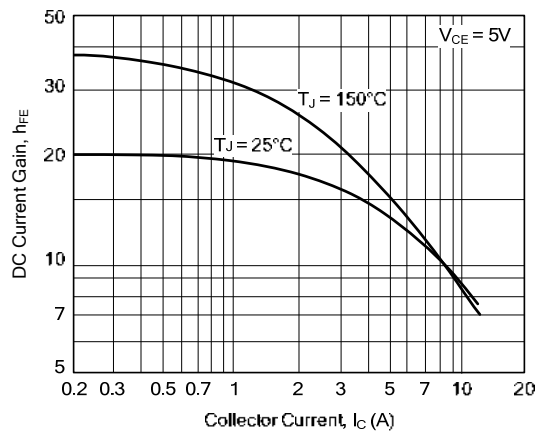


Fig. 6 Collector Saturation Region

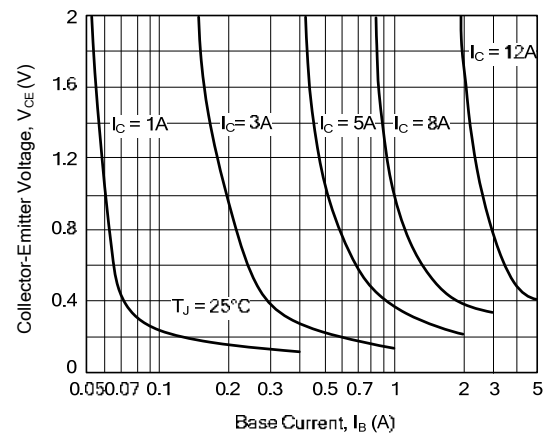


Fig. 7 Base-Emitter Saturation Voltage

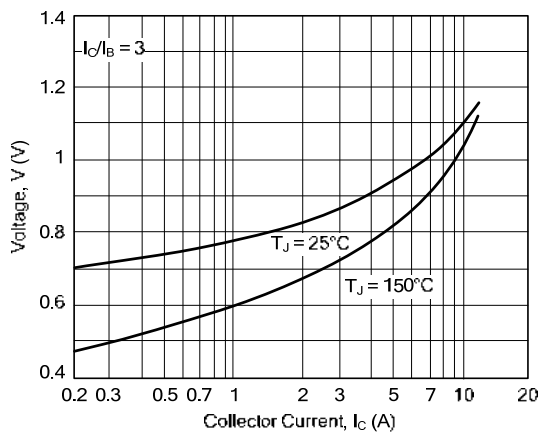


Fig. 8 Collector-Emitter Saturation Voltage

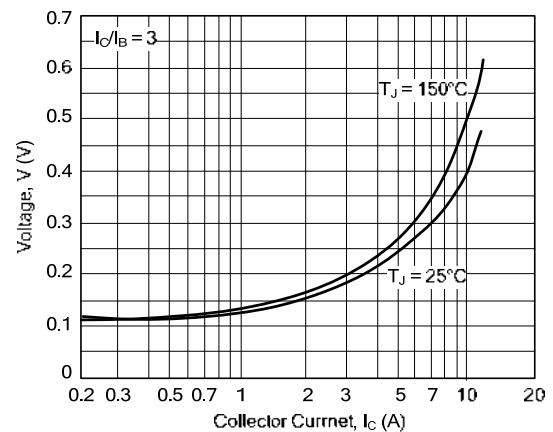


Fig. 9 Collector Cutoff Region

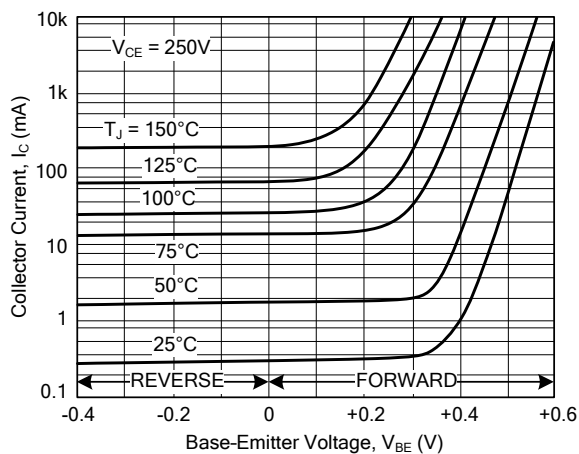
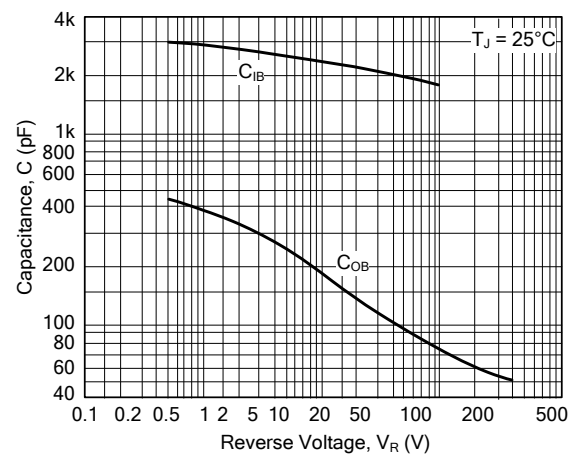


Fig. 10 Capacitance



■ RESISTIVE SWITCHING PERFORMANCE

Fig. 11. Turn-On Time

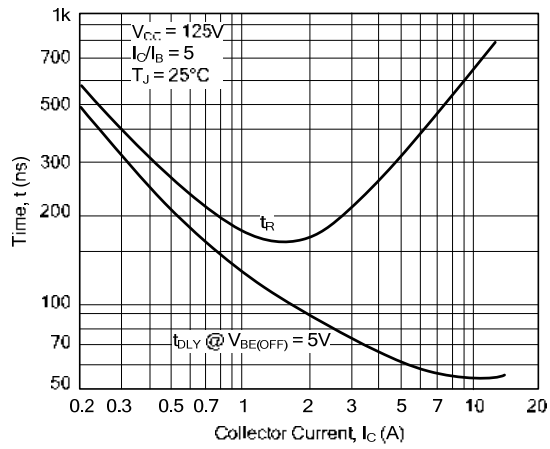


Fig. 12 Turn-Off Time

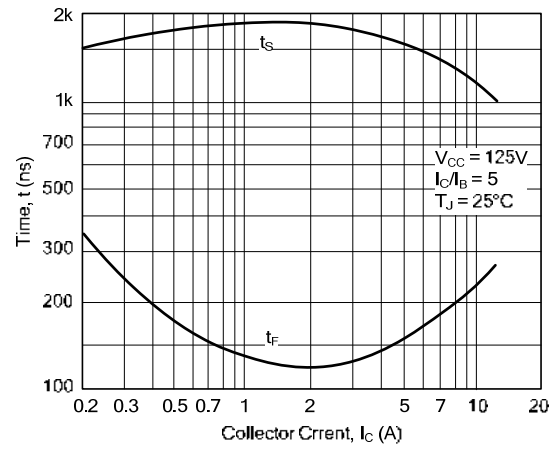
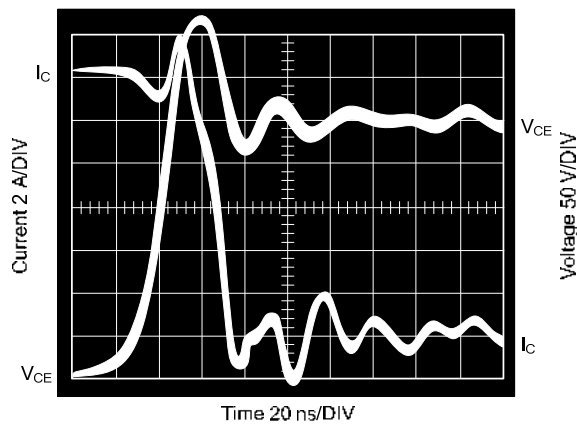


Fig. 13 Typical Inductive Switching Waveforms (at 300V and 12A with $I_{B1} = 2.4A$ and $V_{BE(off)} = 5V$)



■ TO-3PB PACKAGE OUTLINE DIMENSIONS

