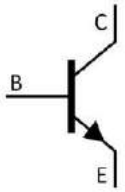
■ PRODUCT CHARACTERISTICS

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

Symbol



■ APPLICATIONS

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

■ FEATURES

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

TO-247

■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	MOT13009DW	TO-247S	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	℃/W
Junction to Case	θ_{JC}	1.55	℃/W

■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note)						
Collector- Emitter Sustaining Voltage	V_{CEO}	I_C = 10mA, 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℃	-	-	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 = 5A, V_{CE} = 5V	-	-	40	
	$h_{FE\ 2}$	I_C = 8A, V_{CE} = 5V	-	-	30	
Current-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C = 5A, I_B = 1A	-	-	1	V
		I_C = 8A, I_B = 1.6A	-	-	1.5	V
		I_C = 12A, I_B = 3A	-	-	3	V
		I_C = 8A, I_B = 1.6A, T_C = 100℃	-	-	2	V
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	I_C = 5A, I_B = 1A	-	-	1.2	V
		I_C = 8A, I_B = 1.6A	-	-	1.6	V
		I_C = 8A, I_B = 1.6A, T_C = 100℃	-	-	1.5	V
DYNAMIC CHARACTERISTICS						
Transition frequency	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	-	180	-	pF
SWITCHING CHARACTERISTICS (Resistive Load, Table 1)						
Delay Time	t_{DLY}	V_{CC} = 125Vdc, I_C = 8A I_{B1} = I_{B2} = 1.6A, t_P = 25μs Duty Cycle ≤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=8A, V_{CLAMP}=300V, I_{B1}=1.6A $V_{BE(OFF)}$ = 5V, T_C = 100℃	-	0.92	2.3	μs
Crossover Time	t_C		-	0.12	0.7	μs

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

■ TYPICAL CHARACTERISTICS

Fig. 1 Forward Bias Safe Operating Area

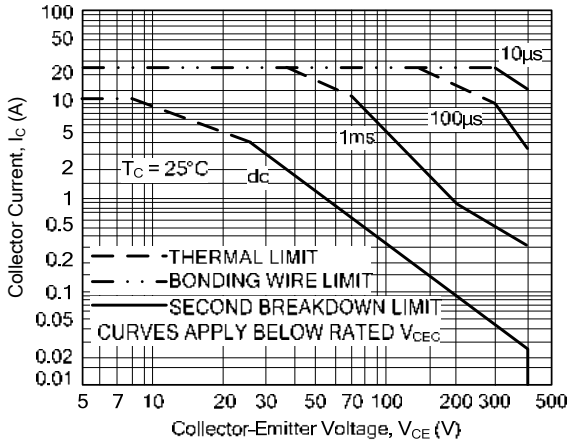


Fig. 2 Reverse Bias Switching Safe Operating Area

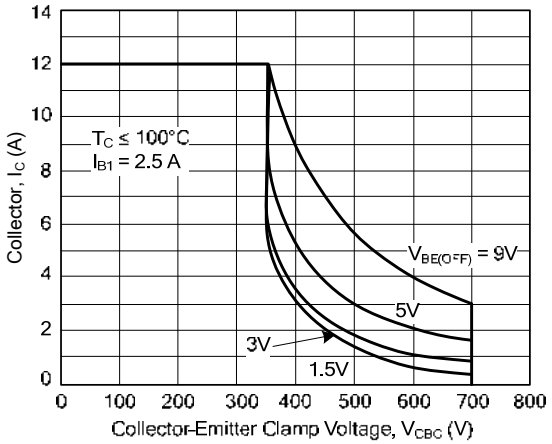


Fig. 3 Forward Bias Power Derating

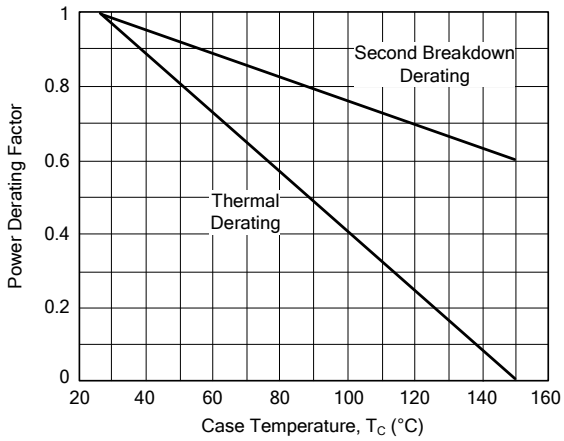
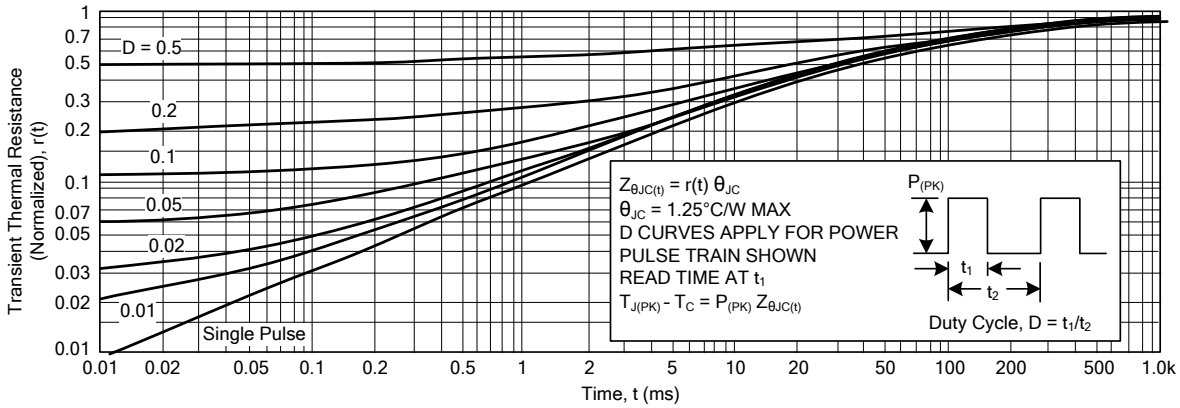


Fig. 4 Typical Thermal Response [$Z_{\theta JC}(t)$]



■ TYPICAL CHARACTERISTICS(Cont.)

Fig. 5 DC Current Gain

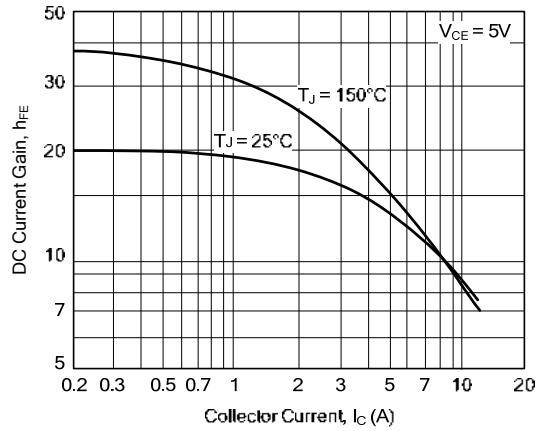


Fig. 6 Collector Saturation Region

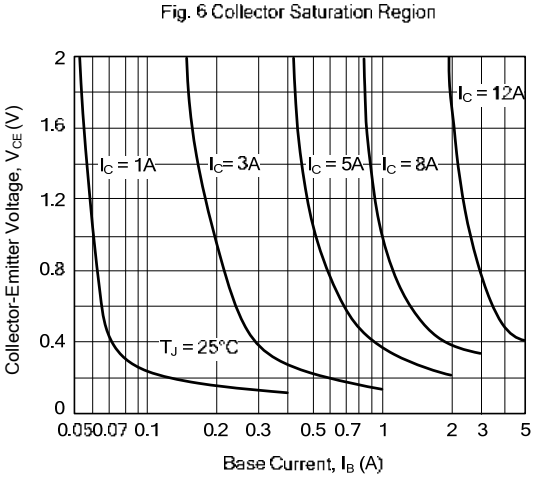


Fig. 7 Base-Emitter Saturation Voltage

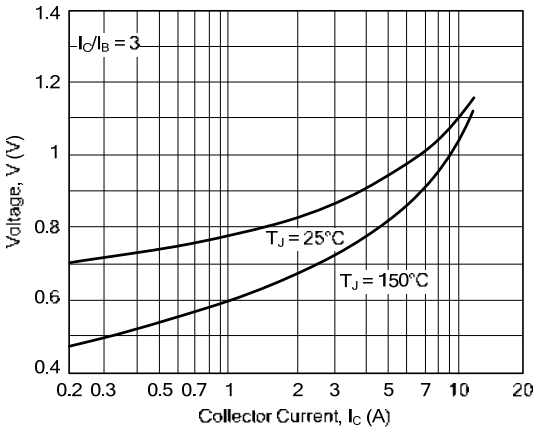


Fig. 8 Collector-Emitter Saturation Voltage

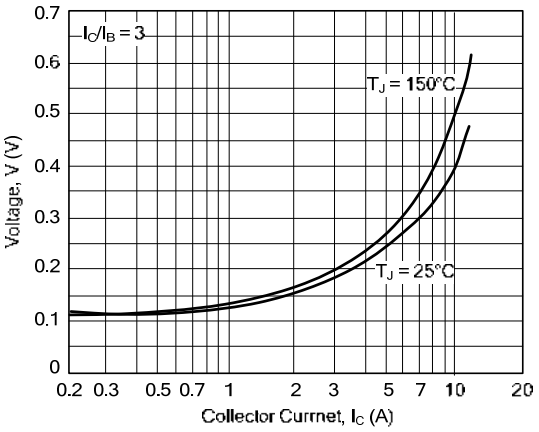


Fig. 9 Collector Cutoff Region

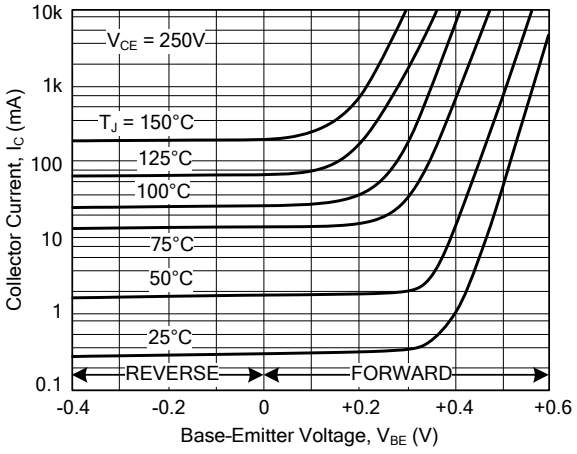
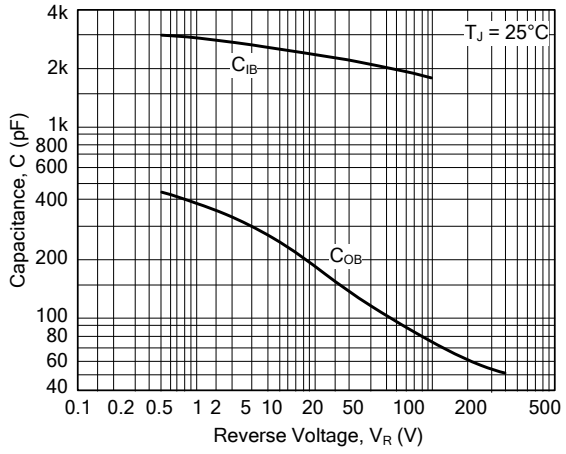


Fig. 10 Capacitance



■ RESISTIVE SWITCHING RERFORMANCE

Fig. 11. Turn-On Time

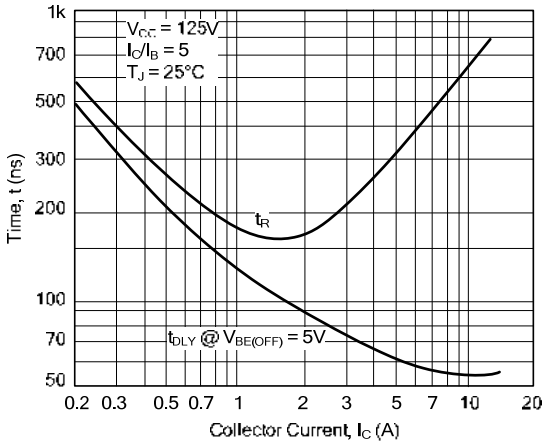


Fig. 12 Turn-Off Time

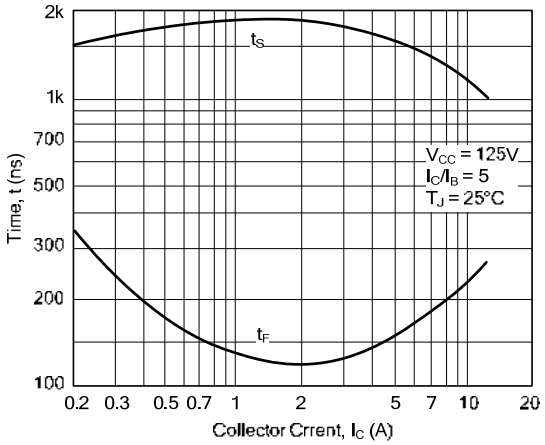
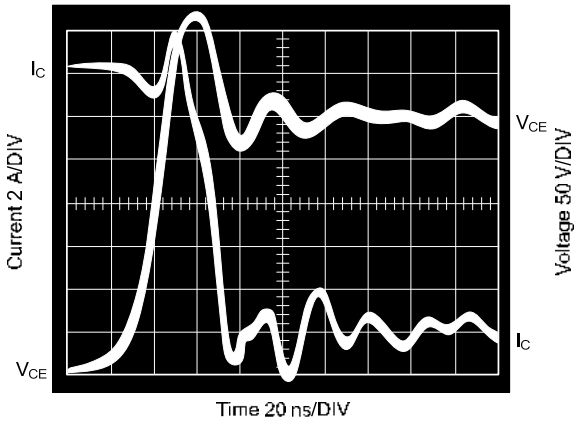


Fig. 13 Typical Inductive Switching Waveforms
(at 300V and 12A with I_{B1} = 2.4A and $V_{BE(off)}$ = 5V)



■ TO-247-3L PACKAGE OUTLINE DIMENSIONS