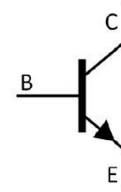


■ PRODUCT CHARACTERISTICS

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

Symbol

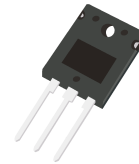


■ APPLICATIONS

- 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
	Peak	I_{CM}	24
Base Current	Continuous	I_B	6
	Peak	I_{BM}	12
Emitter Current	Continuous	I_E	18
	Peak	I_{EM}	36
Power Dissipation	P_D	80	W
Derate above 25°C		640	mW/°C
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

■ 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_{CE0}	$I_C = 10\text{mA}, I_B = 0$	400	-	-	V
Collector Cutoff Current	I_{CEV}	$V_{BE(OFF)} = 1.5V_{DC}$	-	-	1	mA
$V_{CBO}=\text{Rated Value}$		$V_{BE(OFF)} = 1.5V_{DC}, T_C = 100^\circ\text{C}$	-	-	5	
Emitter Cutoff Current	I_{E0}	$V_{EB} = 9V_{DC}, I_C = 0$	-	-	1	mA
ON CHARACTERISTICS (Note)						
DC Current Gain	h_{FE1}	$I_C = 5A, V_{CE} = 5V$	-	-	40	
	h_{FE2}	$I_C = 8A, V_{CE} = 5V$	-	-	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
		$I_C = 8A, I_B = 1.6A, T_C = 100^\circ\text{C}$	-	-	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
		$I_C = 8A, I_B = 1.6A, T_C = 100^\circ\text{C}$	-	-	1.5	V
DYNAMIC CHARACTERISTICS						
Transition frequency	f_T	$I_C = 500\text{mA}, V_{CE} = 10V, f = 1\text{MHz}$	4	-	-	MHz
Output Capacitance	C_{OB}	$V_{CB} = 10V, I_E = 0, f = 0.1\text{MHz}$	-	180	-	pF
SWITCHING CHARACTERISTICS (Resistive Load, Table 1)						
Delay Time	t_{DLY}	$V_{CC} = 125V_{dc}, I_C = 8A$ $I_{B1} = I_{B2} = 1.6A, t_P = 25\mu\text{s}$ 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	$I_C=8A, V_{CLAMP}=300V, I_{B1}=1.6A$	-	0.92	2.3	μs
Crossover Time	t_C	$V_{BE(OFF)} = 5V, T_C = 100^\circ\text{C}$	-	0.12	0.7	μs

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

■ TYPICAL CHARACTERISTICS

Fig. 1 Forward Bias Safe Operating Area

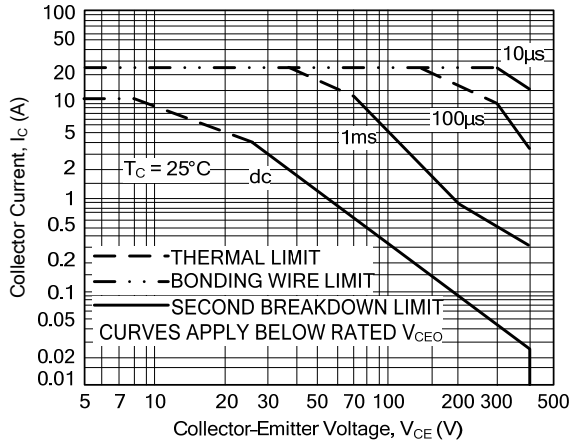


Fig. 2 Reverse Bias Switching Safe Operating Area

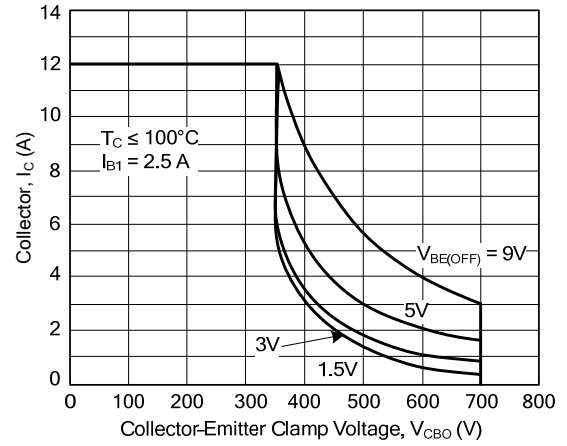


Fig. 3 Forward Bias Power Derating

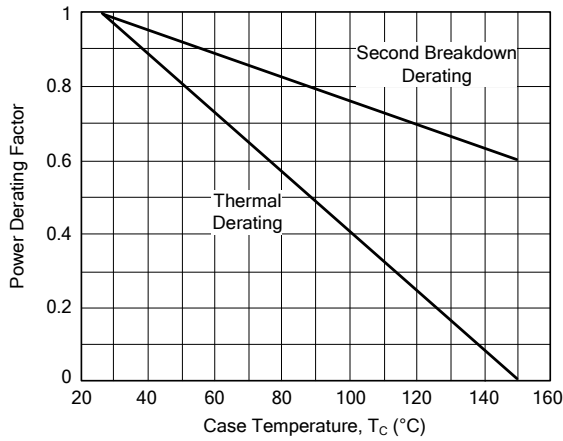
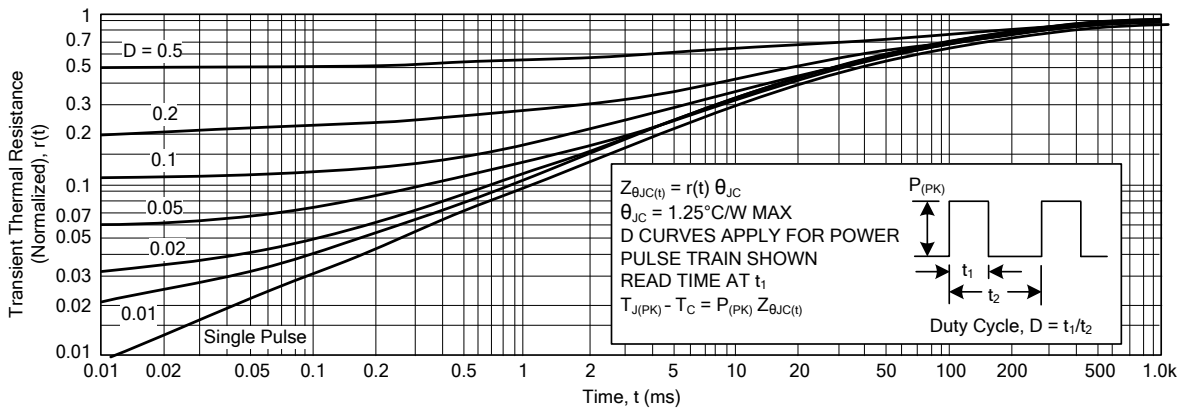


Fig. 4 Typical Thermal Response [$Z_{\theta JC}(t)$]



■ TYPICAL CHARACTERISTICS(Cont.)

Fig. 5 DC Current Gain

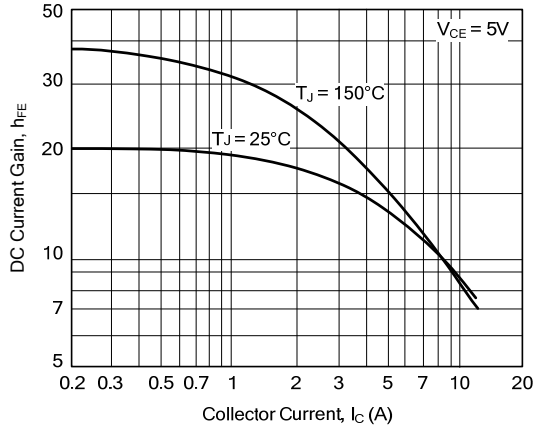


Fig. 6 Collector Saturation Region

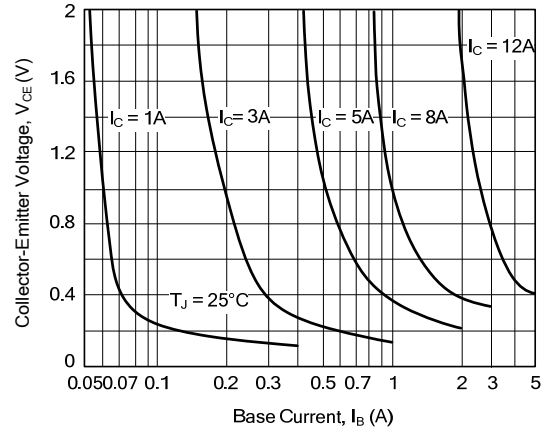


Fig. 7 Base-Emitter Saturation Voltage

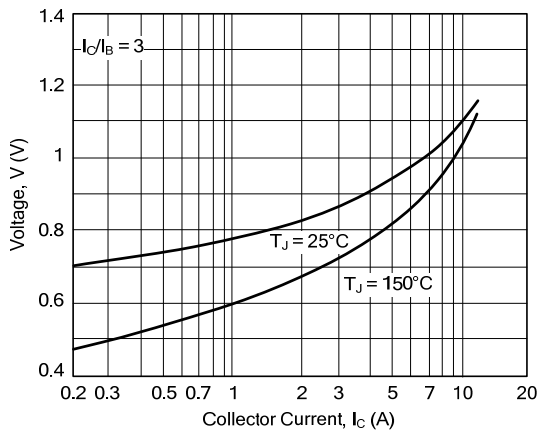


Fig. 8 Collector-Emitter Saturation Voltage

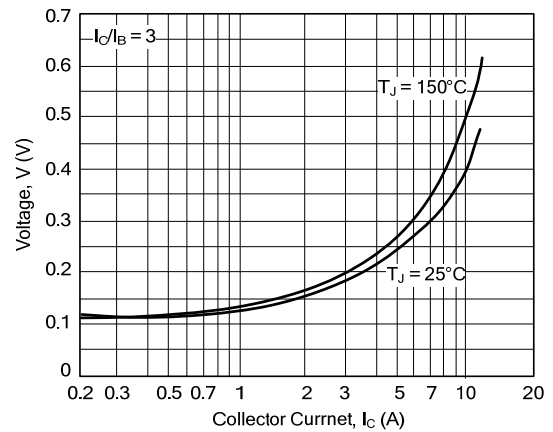


Fig. 9 Collector Cutoff Region

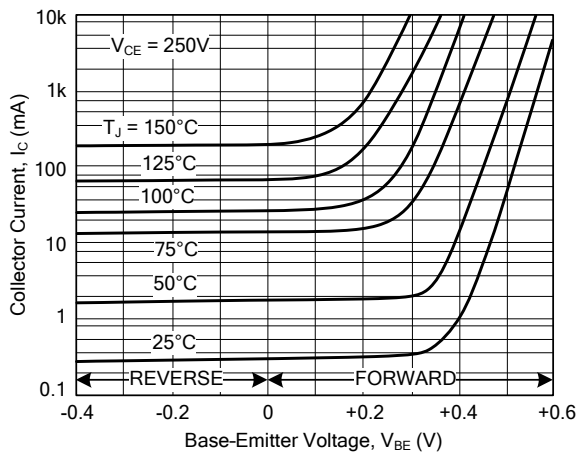
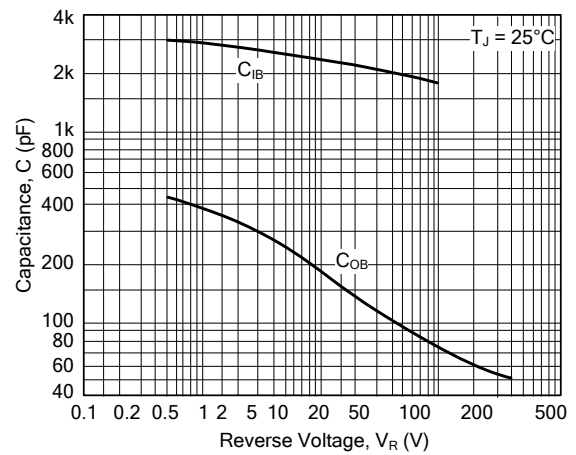


Fig. 10 Capacitance



■ RESISTIVE SWITCHING PERFORMANCE

Fig. 11. Turn-On Time

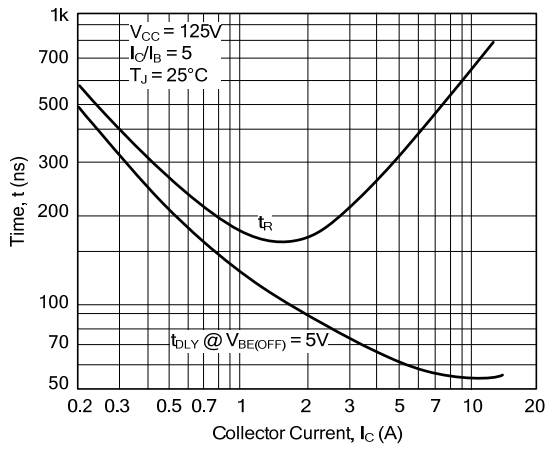


Fig. 12 Turn-Off Time

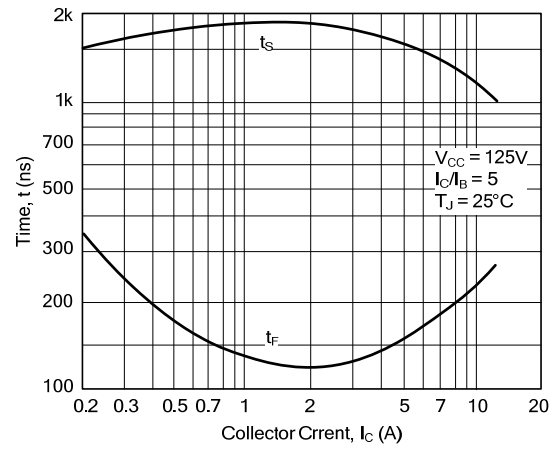
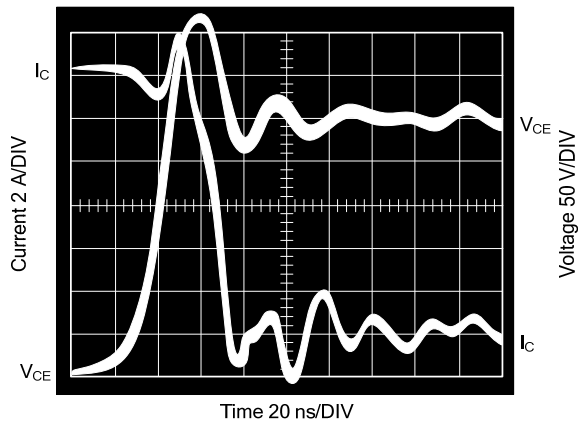


Fig. 13 Typical Inductive Switching Waveforms
(at 300V and 12A with $I_{B1} = 2.4A$ and $V_{BE(OFF)} = 5V$)



■ TO-247-3L PACKAGE OUTLINE DIMENSIONS

