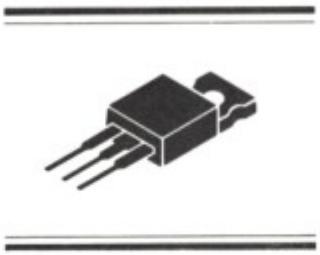
FUJITSU
MICROELECTRONICS

2SC3178

SILICON HIGH SPEED RING EMITTER NPN POWER TRANSISTORS 2 AMP, 850 VOLT

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector to Emitter Voltage	V_{CEO}	850	V
Collector to Base Voltage	V_{CBO}	1200	V
Emitter to Base Voltage	V_{EBO}	7	V
Collector Current-Continuous	I_C	2	A
Collector Current-Pulsed $P_W \leqq 25\ \mu s$, D.R. $\leqq 50\%$	I_{CP}	4	A
Base Current-Continuous	I_B	1	A
Collector Power Dissipation ($T_C = 25^\circ C$)	P_C	60	W
Junction Temperature	T_j	+150	°C
Storage Temperature Range	T_{stg}	−55 ~ +150	°C



ELECTRICAL CHARACTERISTICS ($T_a = 25°C$)

Parameter	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
Collector to Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 1mA, I_E = 0$	1200	–	–	V
Emitter to Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 1mA, I_C = 0$	7	–	–	V
Collector to Emitter Sustaining Voltage	$V_{(BR)CEO}$	$I_C = 10mA, R_{BE} = \infty\Omega$	850	–	–	V
Collector to Emitter Sustaining Voltage	$V_{CEX(SUS)}$	I_C=2.5A, I_{B2}=−0.3A, L=1mH(*1)	900	–	–	V
Collector Cutoff Current	I_{CBO}	$V_{CB} = 1000V, I_E = 0$	–	–	100	μA
Collector Cutoff Current	I_{CBO}	$V_{CB} = 1000V, I_E = 0, T_C = 100^\circ C$	–	–	1	mA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 6V, I_C = 0$	–	–	100	μA
DC Current Gain	h_{FE}	$V_{CE} = 5V, I_C = 1A$ (*2)	10	15	30	–
Collector to Emitter Saturation Voltage	$V_{CE}(sat)$	$I_C = 1A, I_B = 0.2A$ (*2)	–	0.3	1.5	V
Base to Emitter Saturation Voltage	$V_{BE}(sat)$		–	1.0	2.0	V
Output Capacitance	C_{ob}	$V_{CB} = 10V, I_E = 0, f = 1MHz$	–	60	–	pF
Gain Bandwidth Product	f_T	$V_{CE} = 10V, I_C = 0.2A$	–	15	–	MHz
Rise Time	t_r	$V_{CC} = 400V$ (*1) $I_C = 1A, 31_{B1} = -I_{B2} = 0.3A$	–	0.2	0.5	μs
Storage Time	t_{stg}		–	2.5	3.5	μs
Fall Time	t_f		–	0.07	0.3	μs

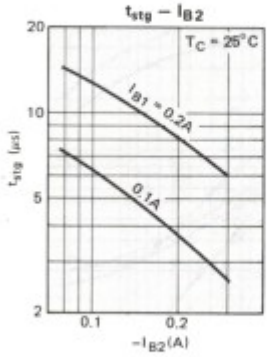
*1 Test Circuit *2 Pulse $P_w \leqq 300\ \mu s$, Duty Ratio $\leqq 6\%$

PACKAGE TYPE: TO-220. See page 5-23 for dimensions.

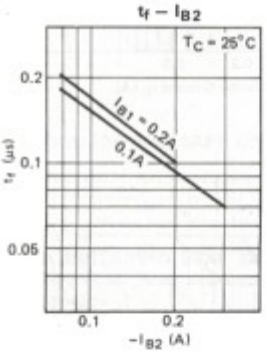
2SC3178

SWITCHING TIME
V_{CC} = 400V
I_C = 1A
P_W = 50 μs
Duty ratio = 1%

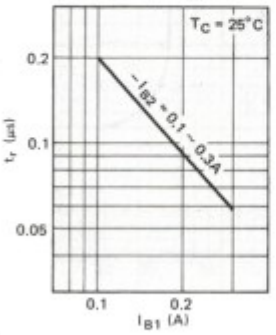
$t_{stg} - I_{B2}$



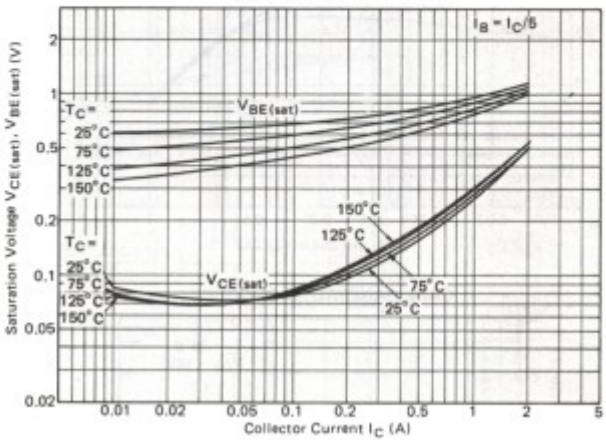
$t_f - I_{B2}$



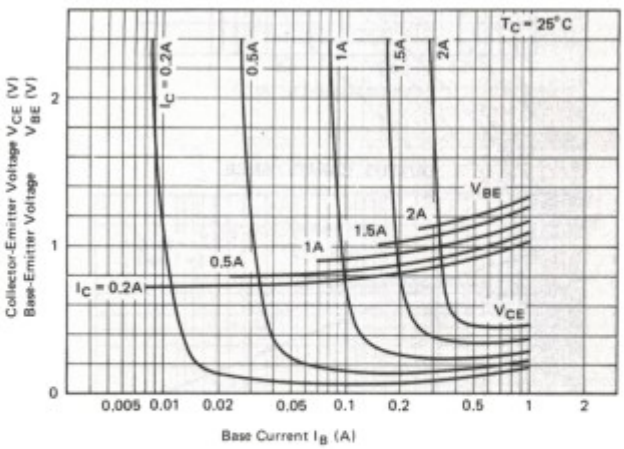
$t_r - I_{B1}$



SATURATION VOLTAGE

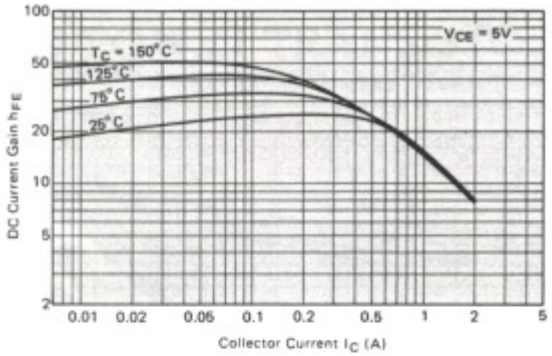


COLLECTOR SATURATION REGION

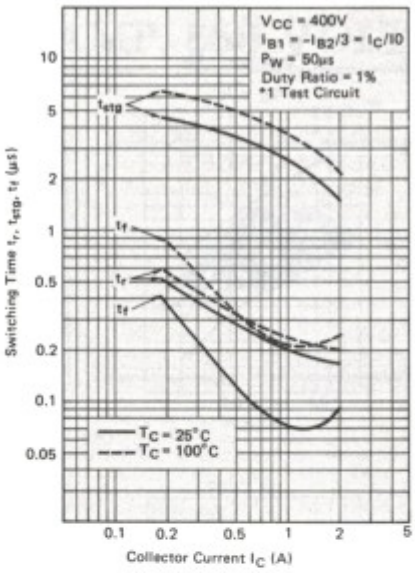


2SC3178

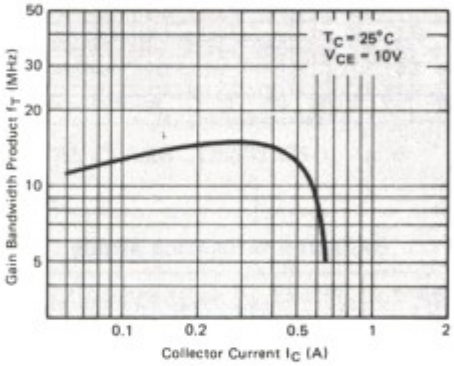
DC CURRENT GAIN



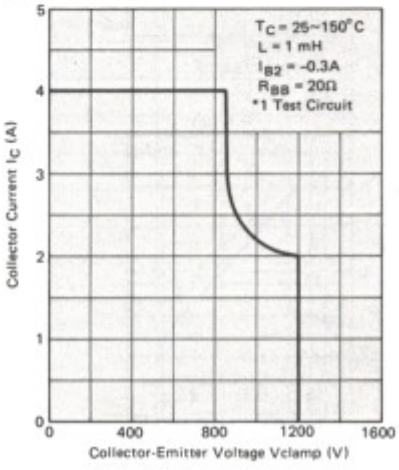
SWITCHING TIME



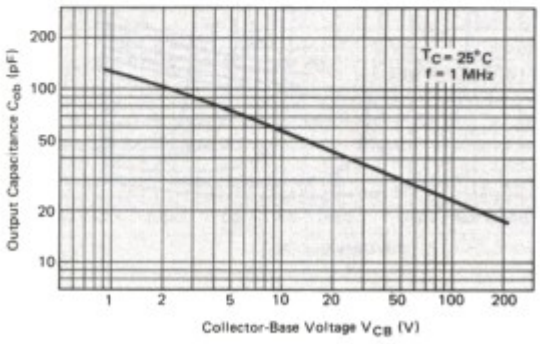
GAIN BANDWIDTH PRODUCT



REVERSE BIAS SAFE OPERATING AREA

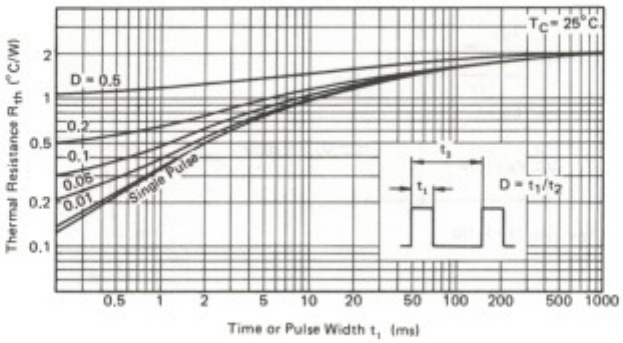


OUTPUT CAPACITANCE

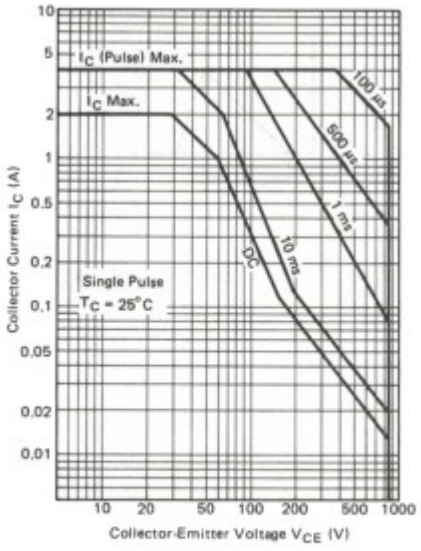


2SC3178

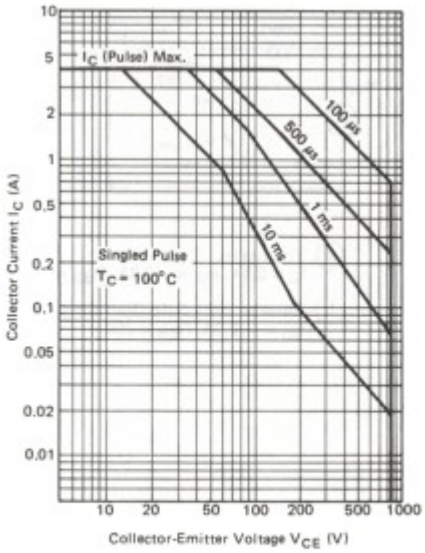
THERMAL RESPONSE



FORWARD BIAS SAFE OPERATING AREA

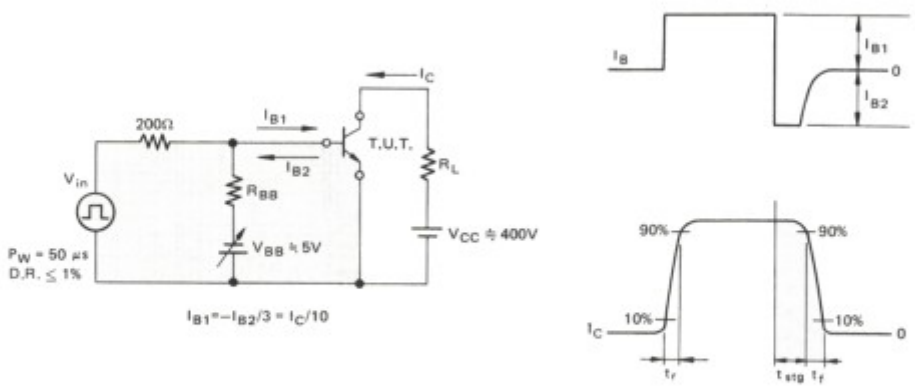


FORWARD BIAS SAFE OPERATING AREA

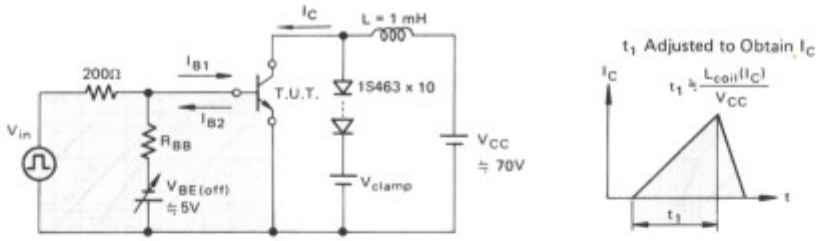


2SC3178

TEST CIRCUIT USED FOR MEASUREMENT OF SWITCHING TIME (RESISTIVE)



TEST CIRCUIT USED FOR MEASUREMENT OF $V_{CEX(SUS)}$ AND REVERSE BIAS SAFE OPERATING AREA



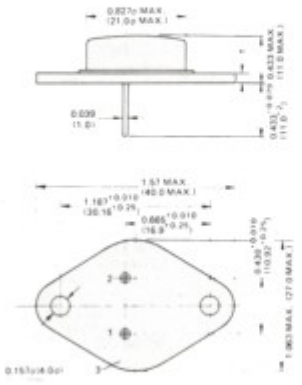
(a) $V_{CEX(SUS)}$
I_C = 2.5A, I_{B2} = −0.3A, R_{BB} = 20Ω, V_{clamp} = 900V

(b) Reverse Bias Safe Operating Area
I_{B2} = −0.3A, R_{BB} = 20Ω

OEM: Fujitsu	C3178 / 2SC3178	Datasheet

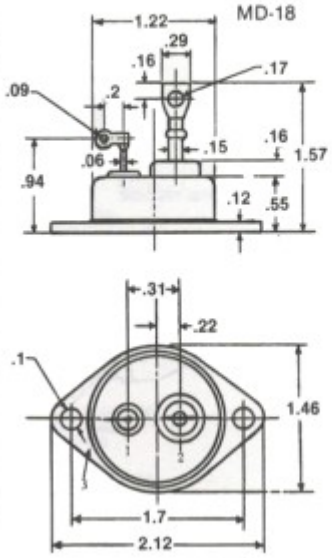
TRANSISTOR PACKAGING INFORMATION

JEDEC TO-3



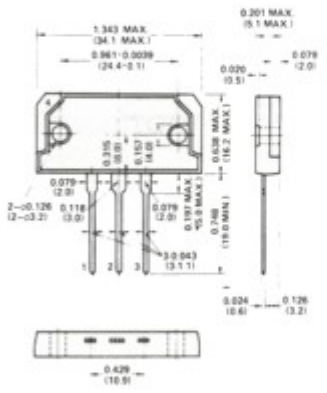
1: Base 2: Emitter 3: Collector (Case)
Dimension in inches and (millimeters)

MD-18



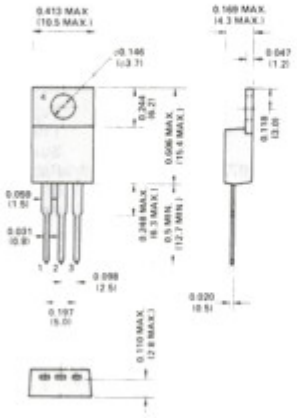
1: Base 2: Emitter 3: Collector

RM-60



1: Base 2: Collector 3: Emitter 4: Fin (Collector)
Dimension in inches and (millimeters)

JEDEC TO-220



1: Base 2: Collector 3: Emitter 4: Fin (Collector)
Dimension in inches and (millimeters)