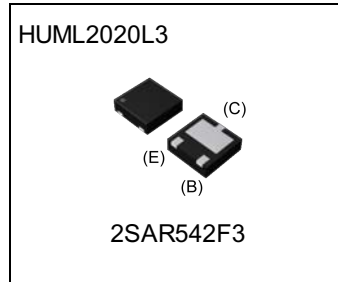


Parameter	Value
V_{CEO}	-30V
I_C	-3A

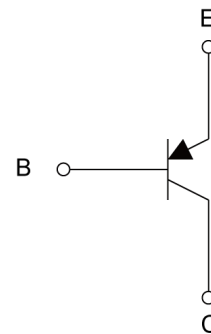
●Outline



●Features

- 1) Suitable for Middle Power Driver.
- 2) Low $V_{CE(sat)}$
 $V_{CE(sat)} = -0.20V(\text{Max.})$
 $(I_C/I_B = -1A/-50mA)$
- 3) High collector current.
 $I_C = -3A(\text{max}), I_{CP} = -6A(\text{max})$
- 4) Leadless small SMD package (HUML2020L3)
 Excellent thermal and electrical conductivity.
- 5) Lead Free/Rohs Compliant.

●Inner circuit



B: BASE
 C: COLLECTOR
 E: EMITTER

●Application

Motor driver, LED driver
 Power supply

●Packaging specifications

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	Marking
2SAR542F3	HUML2020L3	2020	TR	180	8	3000	MQ

● Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Values	Unit
Collector-base voltage	V_{CBO}	-30	V
Collector-emitter voltage	V_{CEO}	-30	V
Emitter-base voltage	V_{EBO}	-6	V
Collector current	I_{C}	-3	A
	I_{CP}^{*1}	-6	A
Base current	I_{B}	-500	mA
Power dissipation	P_{D}^{*2}	1.0	W
	P_{D}^{*3}	2.1	W
Junction temperature	T_{j}	150	$^\circ\text{C}$
Range of storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

● Electrical characteristics ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Collector-base breakdown voltage	BV_{CBO}	$I_{\text{C}} = -100\mu\text{A}$	-30	-	-	V
Collector-emitter breakdown voltage	BV_{CEO}	$I_{\text{C}} = -1\text{mA}$	-30	-	-	V
Emitter-base breakdown voltage	BV_{EBO}	$I_{\text{E}} = -100\mu\text{A}$	-6	-	-	V
Collector cut-off current	I_{CBO}	$V_{\text{CB}} = -30\text{V}$	-	-	-100	nA
Emitter cut-off current	I_{EBO}	$V_{\text{EB}} = -4\text{V}$	-	-	-100	nA
Collector-emitter saturation voltage	$V_{\text{CE(sat)}}$	$I_{\text{C}} = -1\text{A}, I_{\text{B}} = -50\text{mA}$	-	-90	-200	mV
DC current gain	h_{FE}	$V_{\text{CE}} = -2\text{V}, I_{\text{C}} = -500\text{mA}$	200	-	500	-
Transition frequency	f_{T}	$V_{\text{CE}} = -10\text{V}, I_{\text{E}} = 100\text{mA}, f = 100\text{MHz}$	-	240	-	MHz
Output capacitance	C_{ob}	$V_{\text{CB}} = -10\text{V}, I_{\text{E}} = 0\text{mA}, f = 1\text{MHz}$	-	40	-	pF
Turn-On time	t_{on}^{*4}	$I_{\text{C}} = -2.5\text{A}, V_{\text{CC}} = -10\text{V}$	-	45	-	ns
Storage time	t_{stg}^{*4}	$I_{\text{B1}} = -250\text{mA}$	-	200	-	ns
Fall time	t_{f}^{*4}	$I_{\text{B2}} = 250\text{mA}$	-	25	-	ns

*1 $P_w=1\text{ms}$ 1PULSE

*2 Mounted on FR4 board(25.4×25.4×1.6mm, Cu PAD: 645mm²).

*3 $P_w=10\text{ms}$

Mounted on FR4 board(25.4×25.4×1.6mm, Cu PAD: 645mm²).

*4 SEE SWITCHING TIME TEST CIRCUIT

● Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

Fig.1 Grounded Emitter Propagation Characteristics

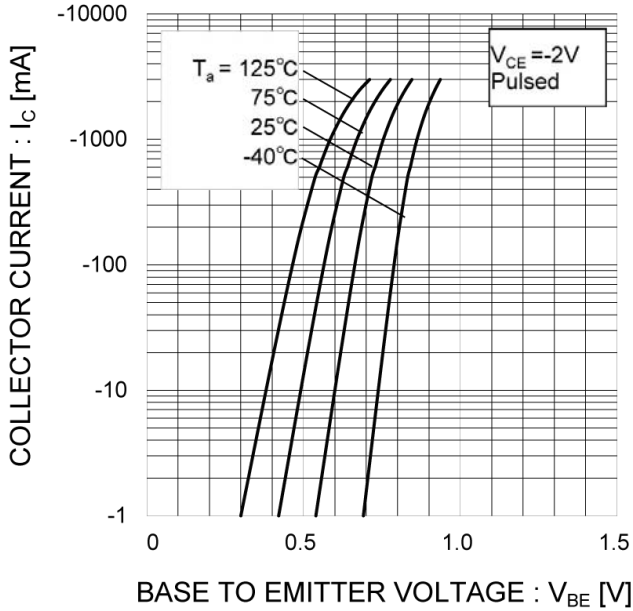


Fig.2 Typical Output Characteristics

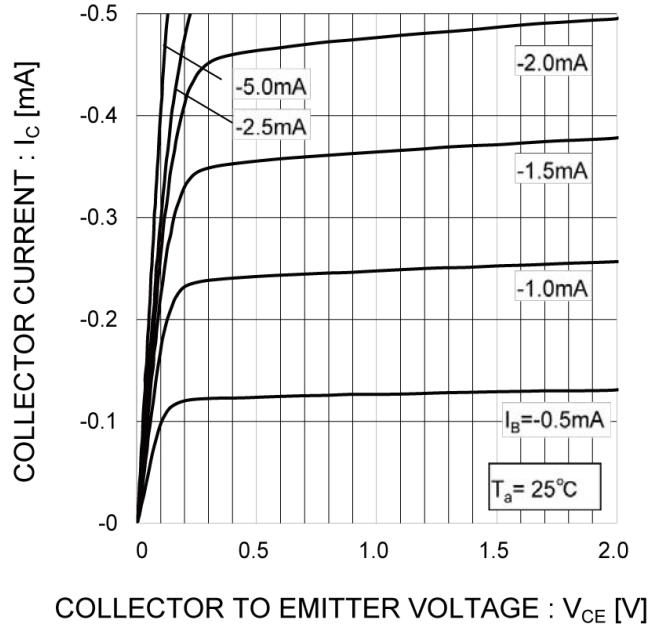


Fig.3 DC Current Gain vs. Collector Current(I)

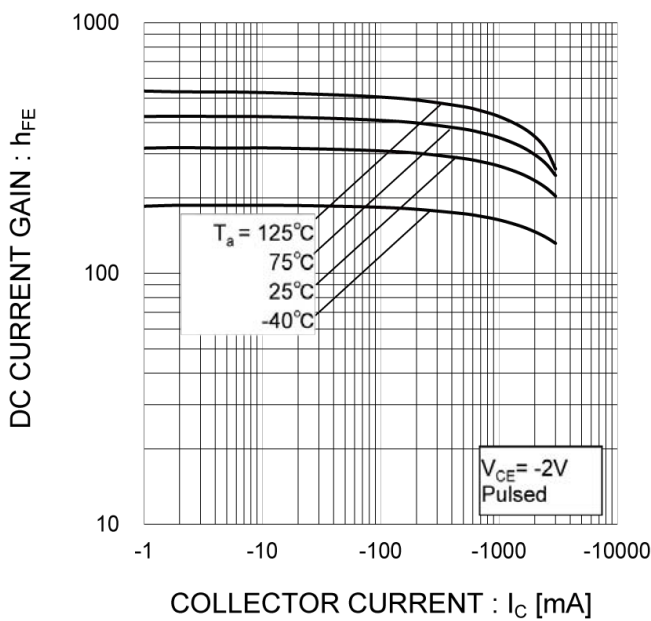
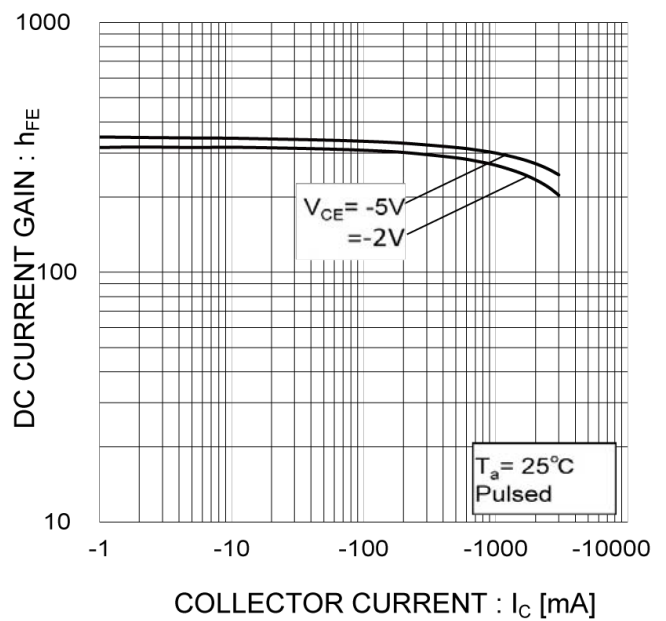


Fig.4 DC Current Gain vs. Collector Current(II)



● Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current(I)

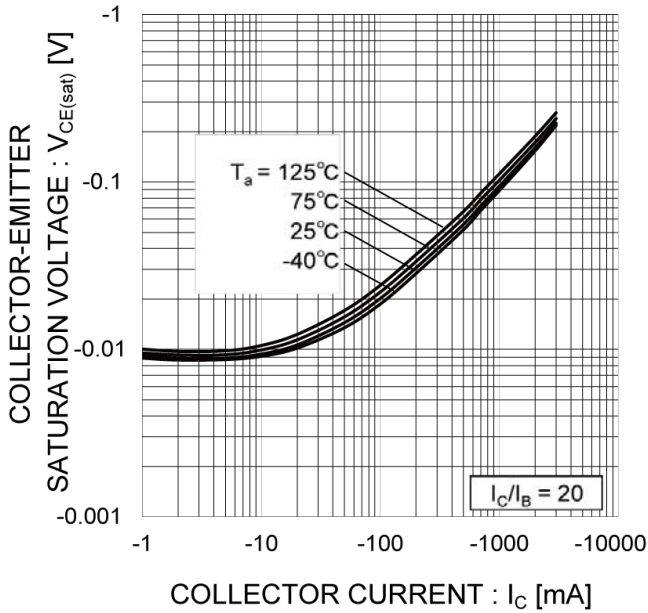


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current(II)

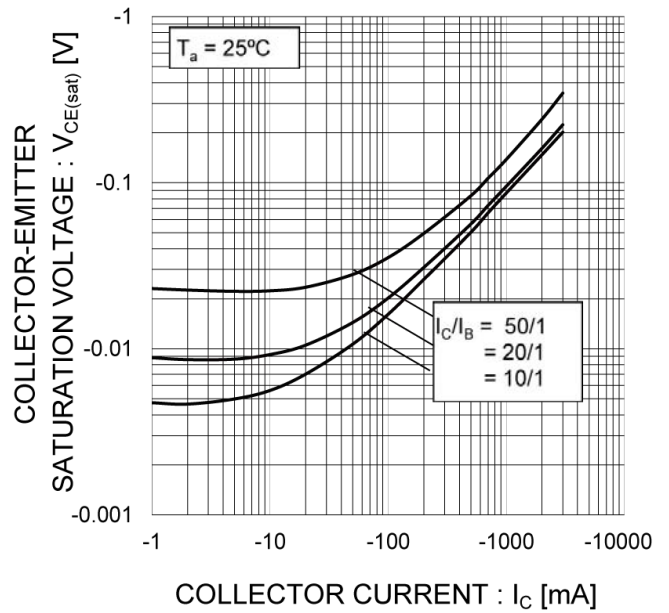


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

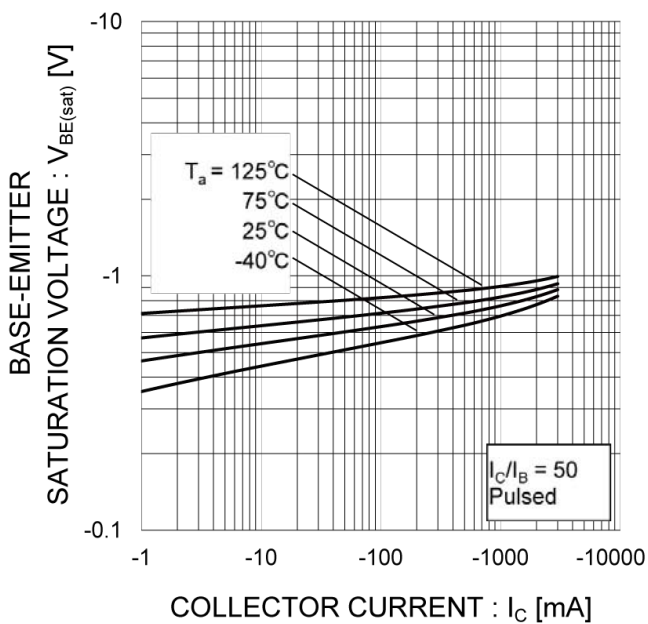
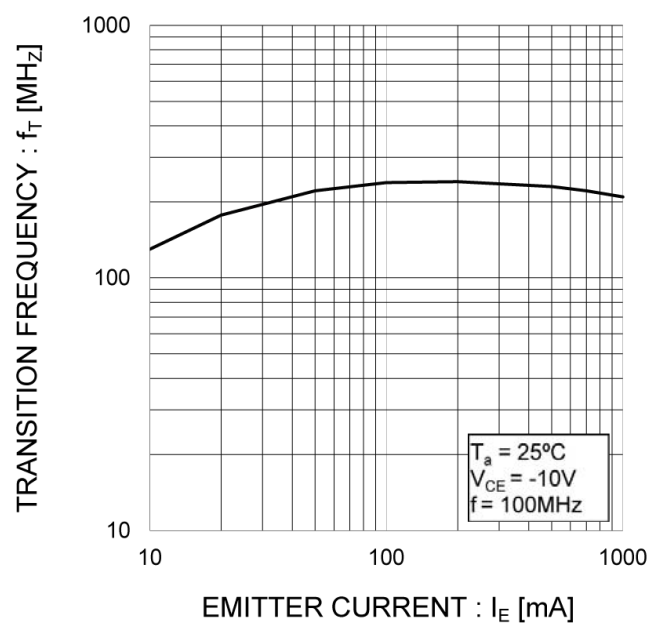


Fig.8 Gain Bandwidth Product vs. Emitter Current



● Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

Fig.9 Emitter input capacitance vs.
Emitter=Base Voltage
Collector output capacitance vs.
Collector-Base Voltage

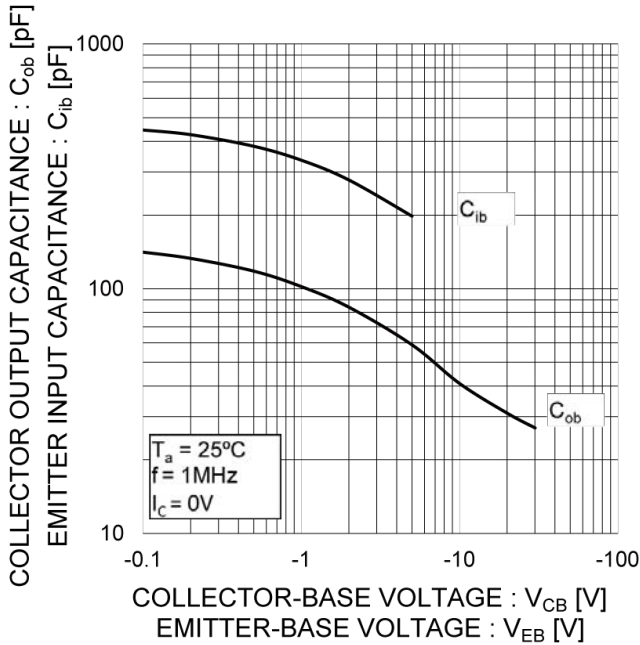
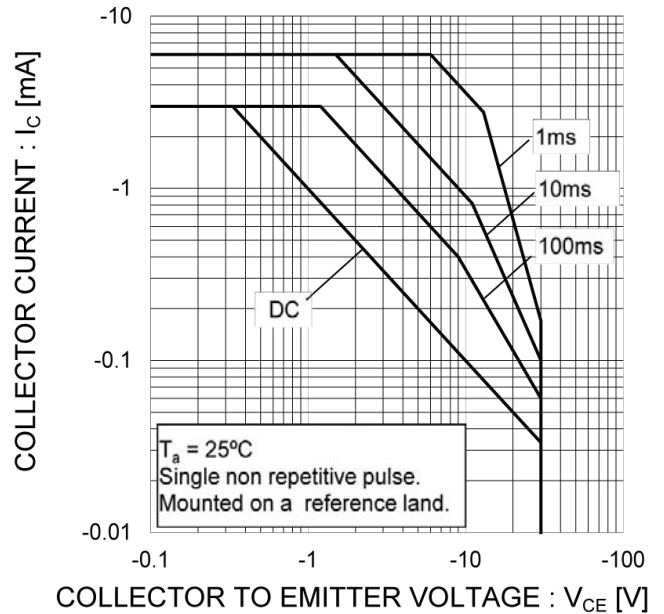
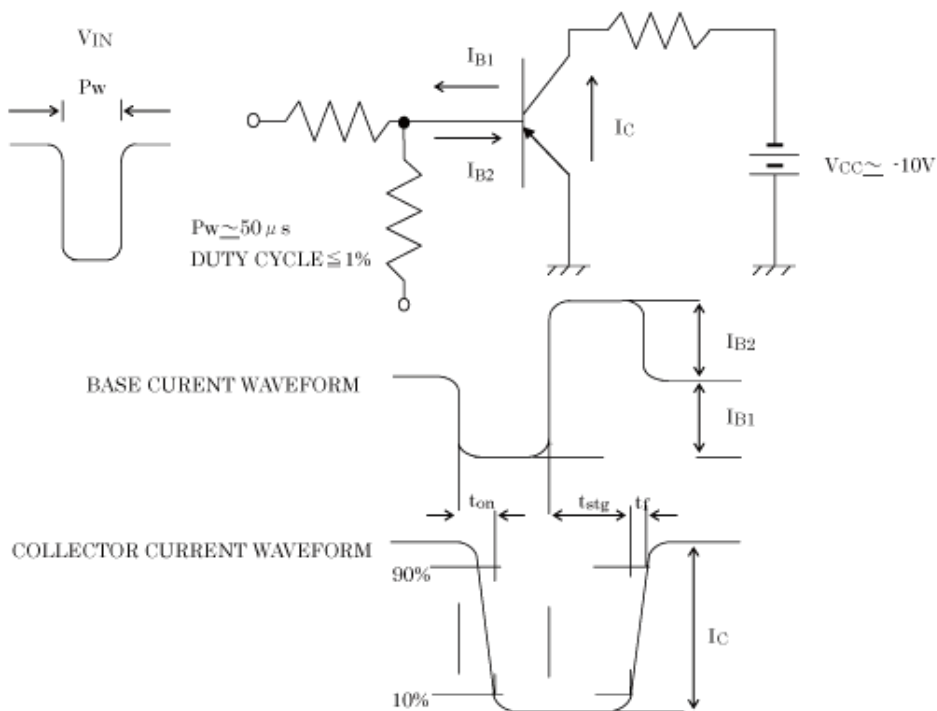


Fig.10 Safe Operating Area

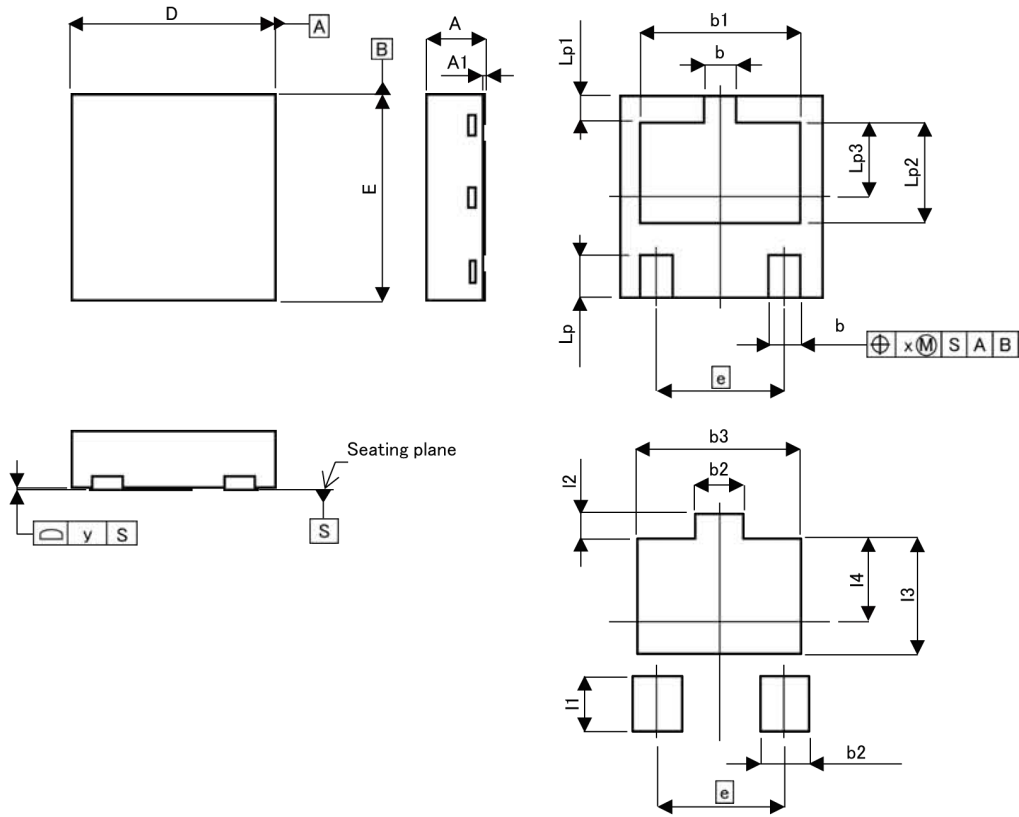


SWITCHING TIME TEST CIRCUIT



●Dimensions

HUML2020L3



Pattern of terminal position areas
[Not a recommended pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.55	0.65	0.022	0.026
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
b1	1.40	1.60	0.055	0.063
D	1.90	2.10	0.075	0.083
E	1.90	2.10	0.075	0.083
e	1.30		0.051	
Lp	0.35	0.45	0.014	0.018
Lp1	0.25 REF		0.01 REF	
Lp2	0.90	1.10	0.035	0.043
Lp3	0.70	0.80	0.028	0.031
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.45	-	0.018
b3	-	1.60	-	0.063
I1	-	0.55	-	0.022
I2	0.25 REF		0.01 REF	
I3	-	1.10	-	0.043
I4	-	0.80	-	0.031

Dimension in mm/inches

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