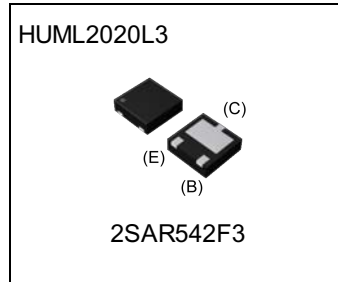


Parameter	Value
$V_{CEO}$	-30V
$I_C$	-3A

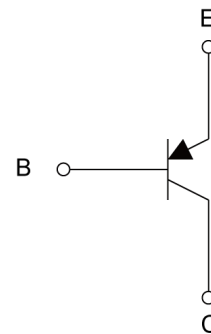
●Outline



●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	$V_{\text{CBO}}$	-30	V
Collector-emitter voltage	$V_{\text{CEO}}$	-30	V
Emitter-base voltage	$V_{\text{EBO}}$	-6	V
Collector current	$I_{\text{C}}$	-3	A
	$I_{\text{CP}}^{*1}$	-6	A
Base current	$I_{\text{B}}$	-500	mA
Power dissipation	$P_{\text{D}}^{*2}$	1.0	W
	$P_{\text{D}}^{*3}$	2.1	W
Junction temperature	$T_{\text{j}}$	150	$^\circ\text{C}$
Range of storage temperature	$T_{\text{stg}}$	-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	$BV_{\text{CBO}}$	$I_{\text{C}} = -100\mu\text{A}$	-30	-	-	V
Collector-emitter breakdown voltage	$BV_{\text{CEO}}$	$I_{\text{C}} = -1\text{mA}$	-30	-	-	V
Emitter-base breakdown voltage	$BV_{\text{EBO}}$	$I_{\text{E}} = -100\mu\text{A}$	-6	-	-	V
Collector cut-off current	$I_{\text{CBO}}$	$V_{\text{CB}} = -30\text{V}$	-	-	-100	nA
Emitter cut-off current	$I_{\text{EBO}}$	$V_{\text{EB}} = -4\text{V}$	-	-	-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	$h_{\text{FE}}$	$V_{\text{CE}} = -2\text{V}, I_{\text{C}} = -500\text{mA}$	200	-	500	-
Transition frequency	$f_{\text{T}}$	$V_{\text{CE}} = -10\text{V}, I_{\text{E}} = 100\text{mA}, f = 100\text{MHz}$	-	240	-	MHz
Output capacitance	$C_{\text{ob}}$	$V_{\text{CB}} = -10\text{V}, I_{\text{E}} = 0\text{mA}, f = 1\text{MHz}$	-	40	-	pF
Turn-On time	$t_{\text{on}}^{*4}$	$I_{\text{C}} = -2.5\text{A}, V_{\text{CC}} = -10\text{V}$	-	45	-	ns
Storage time	$t_{\text{stg}}^{*4}$	$I_{\text{B1}} = -250\text{mA}$	-	200	-	ns
Fall time	$t_{\text{f}}^{*4}$	$I_{\text{B2}} = 250\text{mA}$	-	25	-	ns

\*1  $P_{\text{w}}=1\text{ms}$  1PULSE

\*2 Mounted on FR4 board(25.4×25.4×1.6mm, Cu PAD: 645mm<sup>2</sup>).

\*3  $P_{\text{w}}=10\text{ms}$

Mounted on FR4 board(25.4×25.4×1.6mm, Cu PAD: 645mm<sup>2</sup>).

\*4 SEE SWITCHING TIME TEST CIRCUIT

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

Fig.1 Grounded Emitter Propagation Characteristics

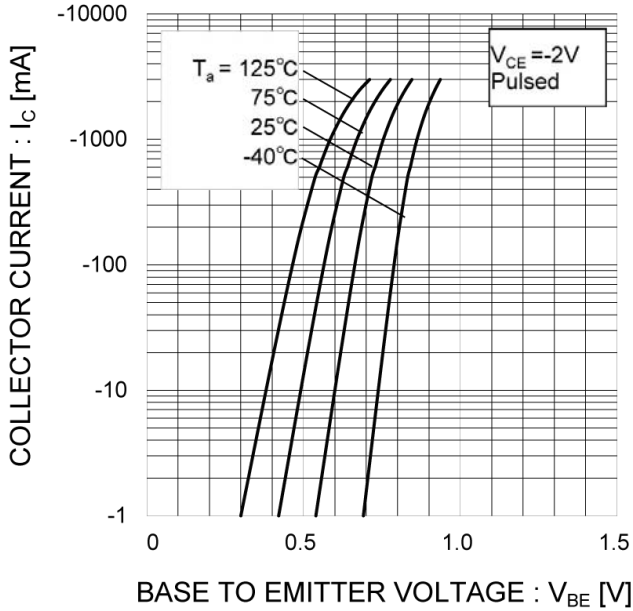


Fig.2 Typical Output Characteristics

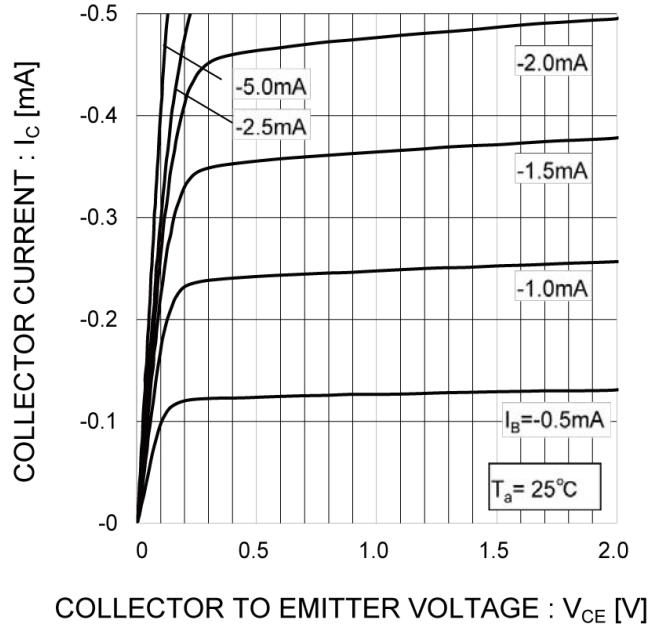


Fig.3 DC Current Gain vs. Collector Current(I)

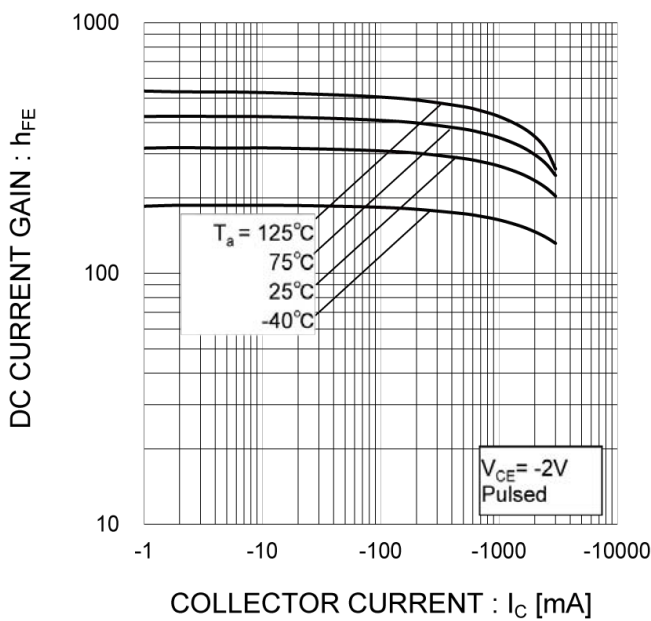
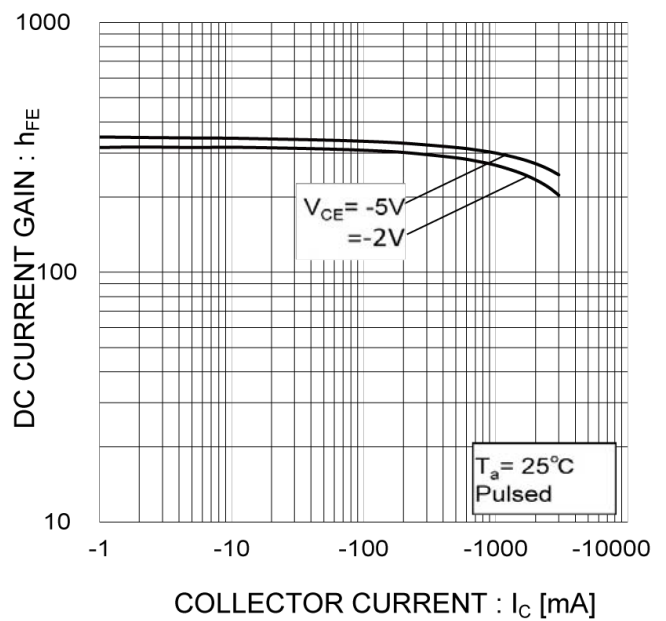


Fig.4 DC Current Gain vs. Collector Current(II)



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

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

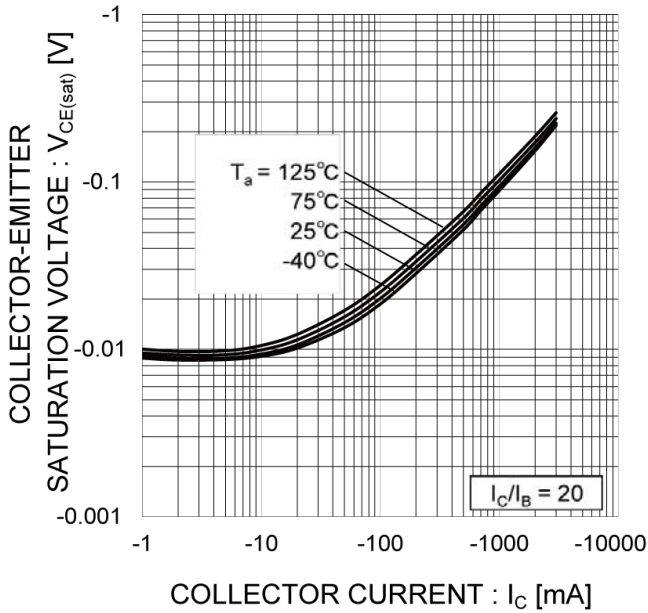


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current(II)

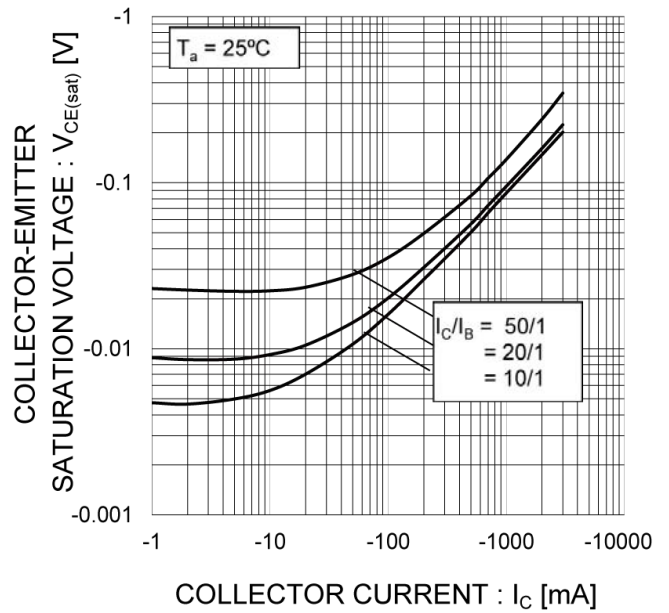


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

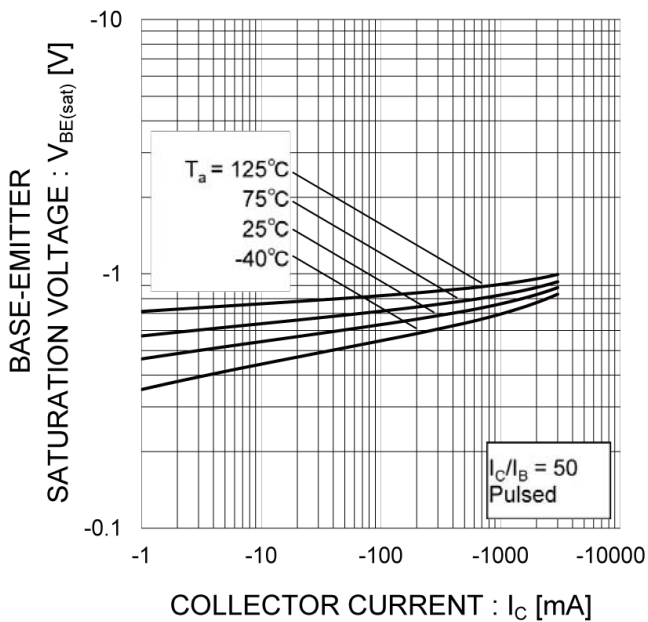
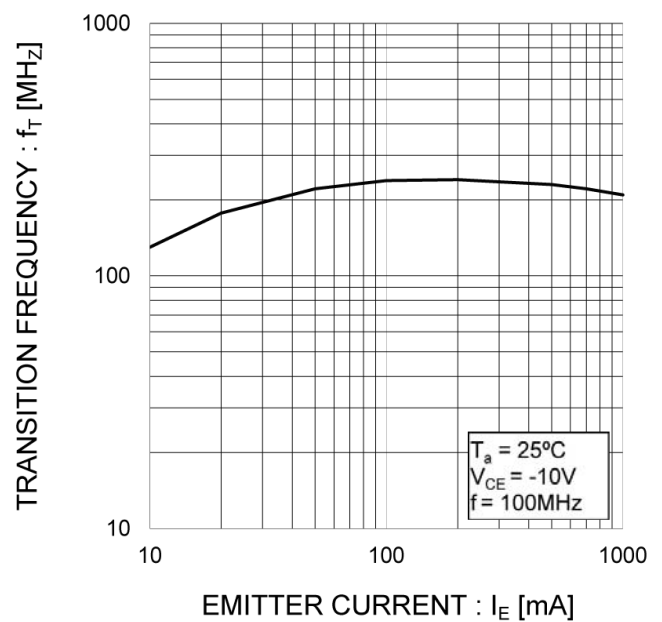


Fig.8 Gain Bandwidth Product vs. Emitter Current



● 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

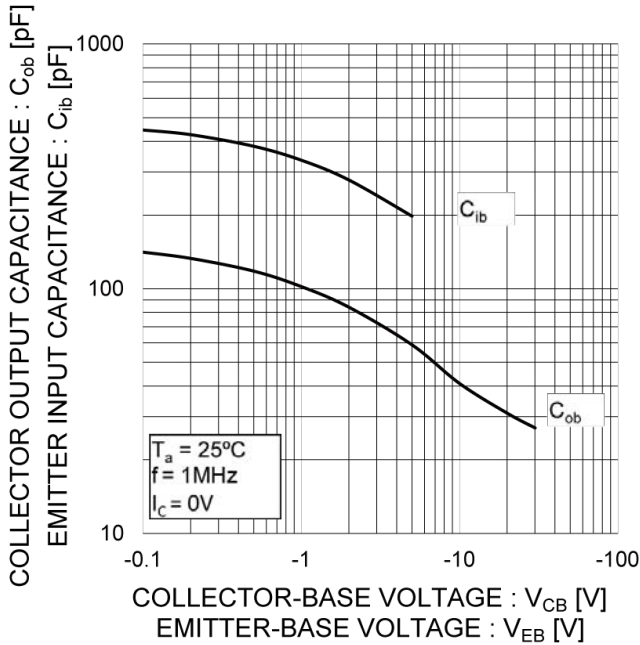
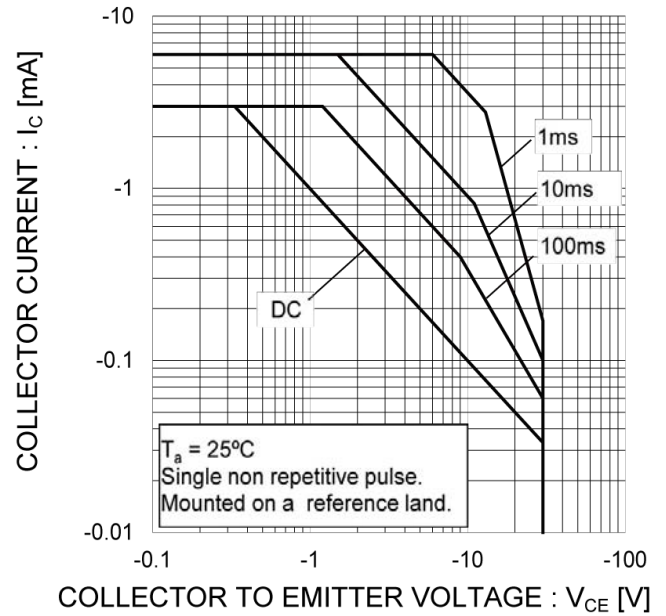
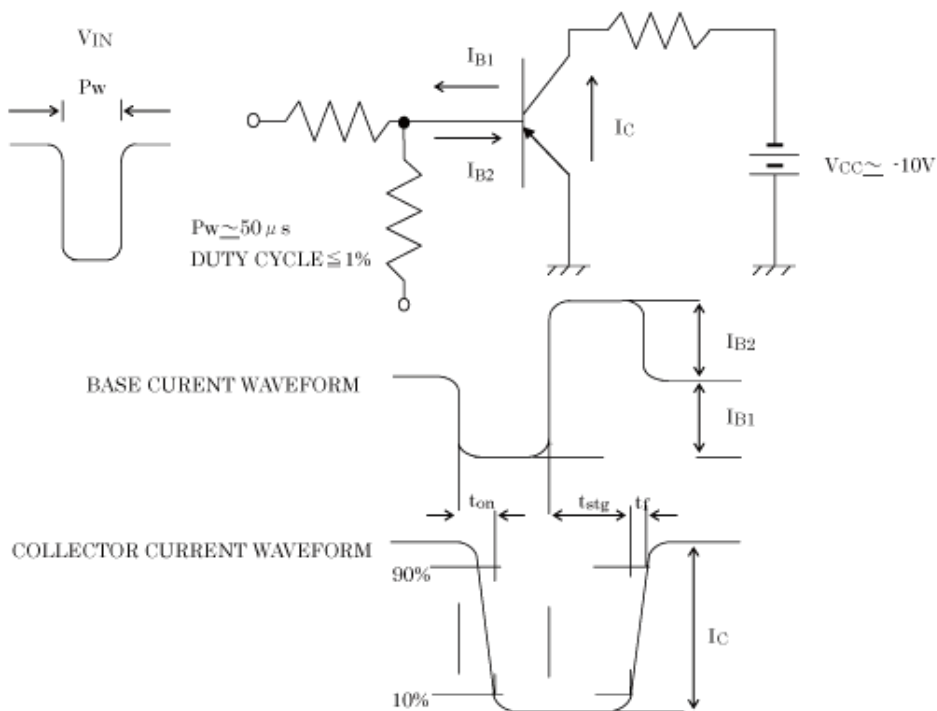


Fig.10 Safe Operating Area

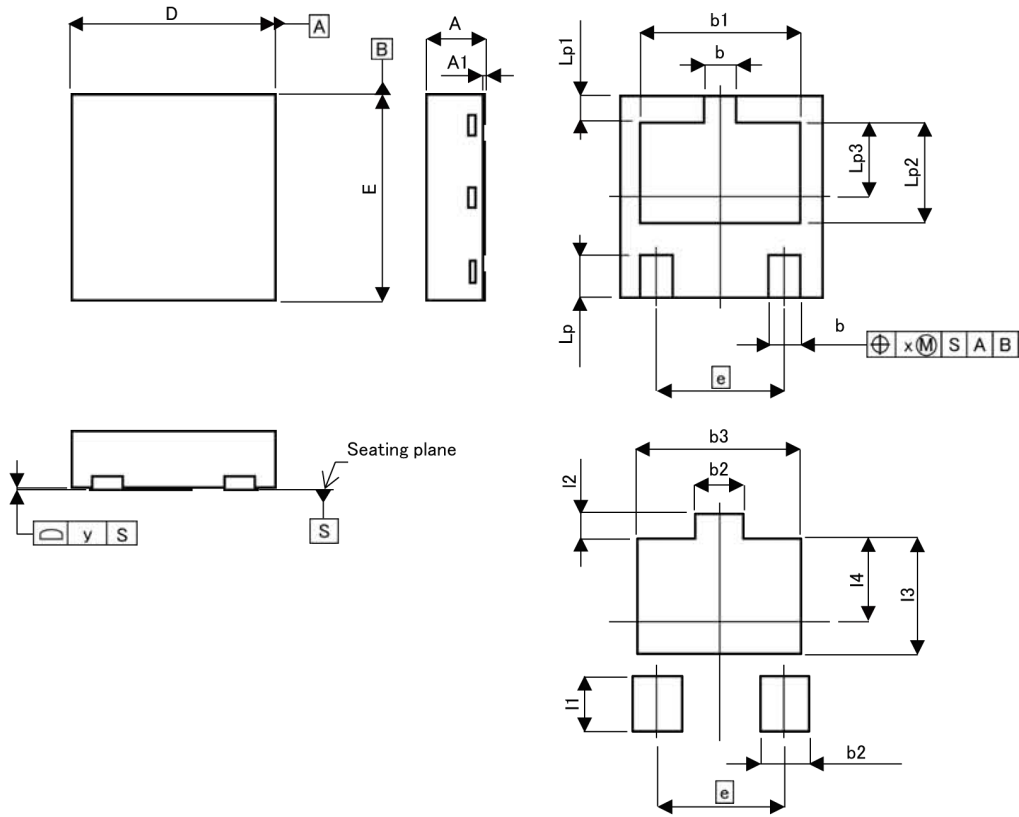


SWITCHING TIME TEST CIRCUIT



●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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