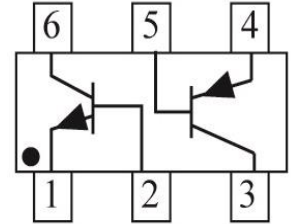
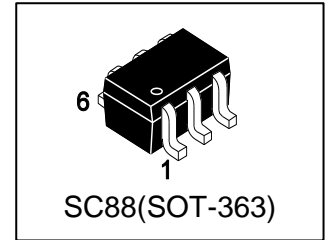


LMBT3946DW1T1G

Dual General Purpose Transistors PNP/NPN Silicon

1. FEATURES

- We declare that the material of product compliance with RoHS requirements and Halogen Free.
- Low $V_{CE(sat)}$, $\leq 0.4\text{ V}$
- Simplifies circuit design
- Reduces board space
- Reduces component count
- h_{FE} , 100–300



2. DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
LMBT3946DW1T1G	46	3000/Tape&Reel
LMBT3946DW1T3G	46	13000/Tape&Reel

3. MAXIMUM RATINGS($T_a = 25^\circ\text{C}$)

Parameter(PNP)	Symbol	Limits	Unit
Collector–Emitter Voltage	V_{CEO}	-40	V
Collector–Base Voltage	V_{CBO}	-40	V
Emitter–Base Voltage	V_{EBO}	-6	V
Collector Current — Continuous	I_C	-200	mA

Parameter(NPN)	Symbol	Limits	Unit
Collector–Emitter Voltage	V_{CEO}	40	V
Collector–Base Voltage	V_{CBO}	60	V
Emitter–Base Voltage	V_{EBO}	6	V
Collector Current — Continuous	I_C	200	mA

4. THERMAL CHARACTERISTICS

Parameter	Symbol	Limits	Unit
Total Device Dissipation, FR-5 Board (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above 25°C	PD	150 1.2	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction–to–Ambient(Note 1)	$R_{\theta JA}$	833	$^\circ\text{C}/\text{W}$
Junction and Storage temperature	T_J, T_{stg}	-55~+150	$^\circ\text{C}$

1. FR-5 = 1.0×0.75×0.062 in.

5. ELECTRICAL CHARACTERISTICS (Ta= 25°C)

PNP

OFF CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector–Emitter Breakdown Voltage (IC = -1.0 mA, IB = 0)	VBR(CEO)	-40	-	-	V
Collector–Base Breakdown Voltage (IC = -10 μA, IE = 0)	VBR(CBO)	-40	-	-	V
Emitter–Base Breakdown Voltage (IE = -10 μA, IC = 0)	VBR(EBO)	-6	-	-	V
Collector Cutoff Current (VCE = -30 V, VEB = -3.0V)	ICEX	-	-	-50	nA
Base Cutoff Current (VCE = -30 V, VEB = -3.0V)	IBL	-	-	-50	nA
Collector Cutoff Current (VCB = -40 V, IE=0)	ICBO	-	-	-100	nA
Emitter-Base cut-off current (IC = 0, VEB=-6.0V)	IEBO	-	-	-100	nA
Collector-Emitter cutoff Current (VCE = -40V, IB=0)	ICEO	-	-	-10	μA

ON CHARACTERISTICS (Note 2.)

DC Current Gain (IC = -0.1 mA, VCE = -1.0 V) (IC = -1.0 mA, VCE = -1.0 V) (IC = -10 mA, VCE = -1.0 V) (IC = -50 mA, VCE = -1.0 V) (IC = -100 mA, VCE = -1.0 V)	HFE	60	-	-	
		80	-	-	
		100	-	300	
		60	-	-	
		30	-	-	
Collector–Emitter Saturation Voltage (IC = -10 mA, IB = -1.0 mA) (IC = -50 mA, IB = -5.0 mA)	VCE(sat)	-	-	-0.25 -0.4	V
Base–Emitter Saturation Voltage (IC = -10 mA, IB = -1.0 mA) (IC = -50 mA, IB = -5.0 mA)	VBE(sat)	-0.65 -	- -	-0.85 -0.95	V

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product (IC = -10mA, VCE= -20V, f = 100MHz)	fT	250	-	-	MHz
Output Capacitance (VCB = -5.0 V, IE = 0, f = 1.0 MHz)	Cobo	-	-	4.5	pF
Input Capacitance (VEB = -0.5 V, IC = 0, f = 1.0 MHz)	Cibo	-	-	10	pF

SWITCHING CHARACTERISTICS

Delay Time	(VCC = -3.0 V, VBE=0.5V, IC = -10mA, IB1 = -1.0 mA)	td	-	-	35	ns
Rise Time		tr	-	-	35	
Storage Time	(VCC = -3.0 V, IC = -10 mA, IB1 = IB2 = -1.0 mA)	ts	-	-	225	
Fall Time		tf	-	-	75	

2.Pulse Test: Pulse Width ≤300 μs, Duty Cycle ≤2.0%.

5. ELECTRICAL CHARACTERISTICS (Ta= 25°C)
NPN
OFF CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector–Emitter Breakdown Voltage (IC = 1.0 mA, IB = 0)	VBR(CEO)	40	-	-	V
Collector–Base Breakdown Voltage (IC = 10 μA, IE = 0)	VBR(CBO)	60	-	-	V
Emitter–Base Breakdown Voltage (IE = 10 μA, IC = 0)	VBR(EBO)	6	-	-	V
Collector Cutoff Current (VCE = 30 V, VEB = 3.0V)	ICEX	-	-	50	nA
Base Cutoff Current (VCE = 30 V, VEB = 3.0V)	IBL	-	-	50	nA
Collector Cutoff Current (VCB = 60 V,IE=0)	ICBO	-	-	100	nA
Emitter-Base cut-off current (IC = 0, VEB=6.0V)	IEBO	-	-	100	nA
Collector-Emitter cutoff Current (VCE = 40V, IB=0)	ICEO	-	-	10	μA

ON CHARACTERISTICS (Note 3.)

DC Current Gain (IC = 0.1 mA, VCE = 1.0 V) (IC = 1.0 mA, VCE = 1.0 V) (IC = 10 mA, VCE = 1.0 V) (IC = 50 mA, VCE = 1.0 V) (IC = 100 mA, VCE = 1.0 V)	HFE	40 70 100 60 30	- - - - -	- - 300 - -	
Collector–Emitter Saturation Voltage (IC = 10 mA, IB = 1.0 mA) (IC = 50 mA, IB = 5.0 mA)	VCE(sat)	- -	- -	0.2 0.3	V
Base–Emitter Saturation Voltage (IC = 10 mA, IB = 1.0 mA) (IC = 50 mA, IB = 5.0 mA)	VBE(sat)	- -	- -	0.85 0.95	V

SMALL–SIGNAL CHARACTERISTICS

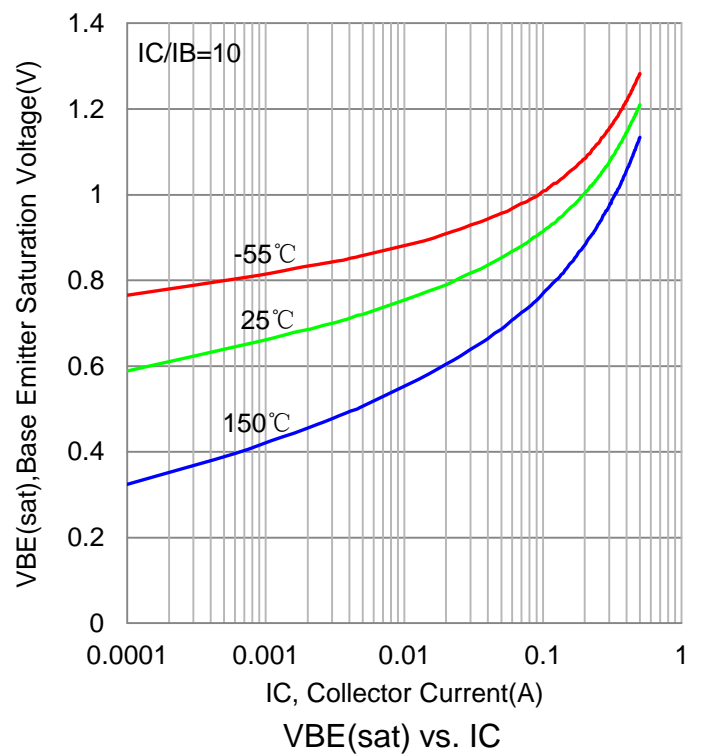
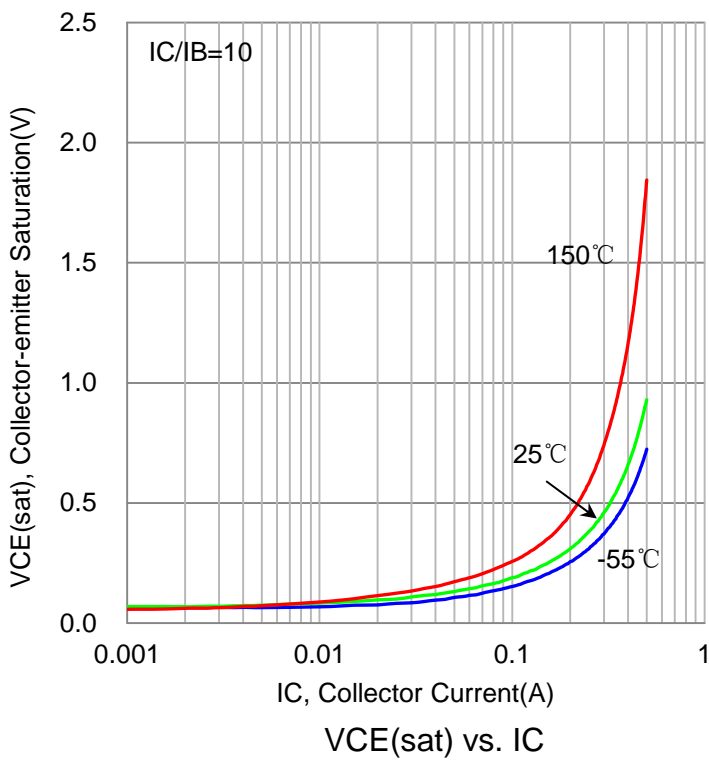
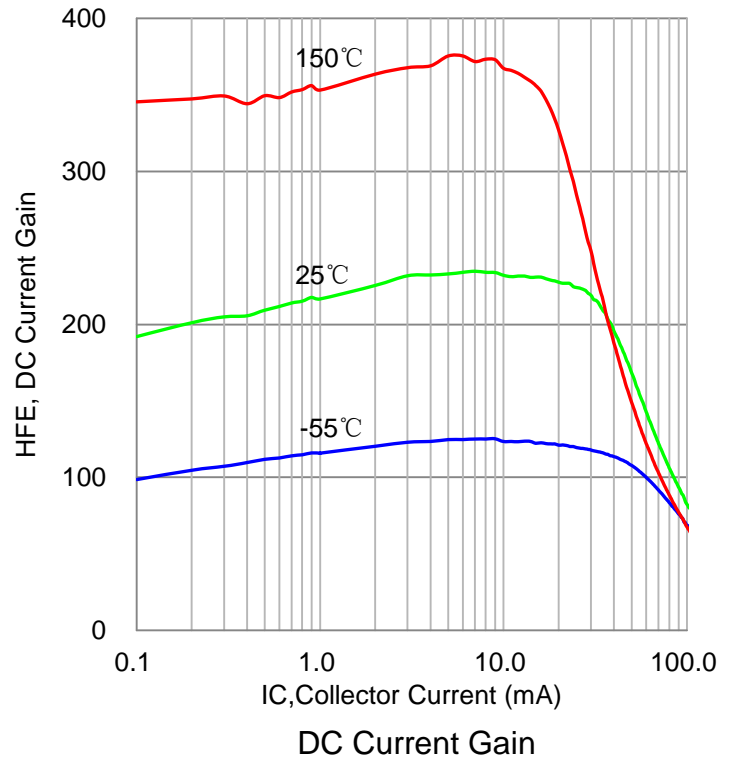
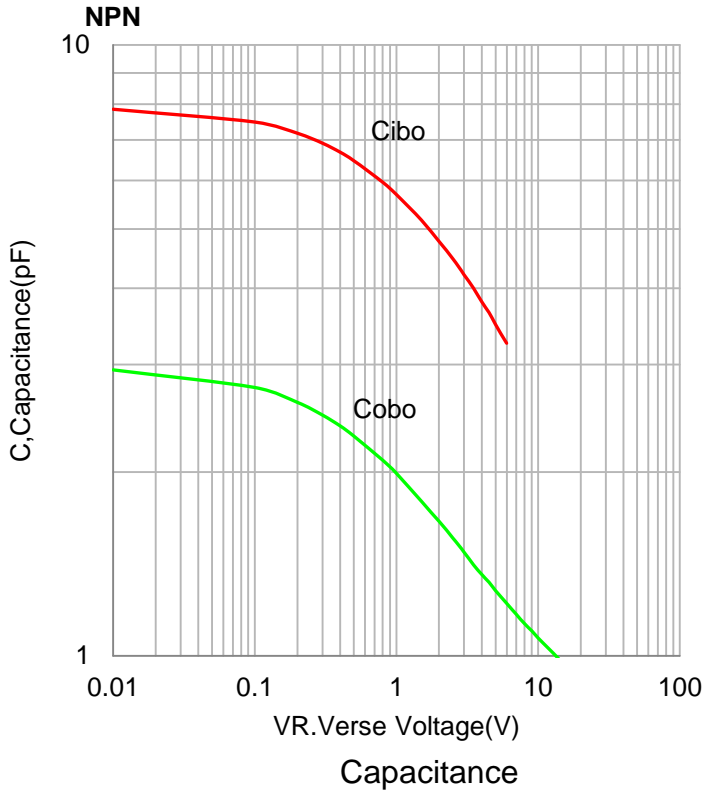
Current–Gain — Bandwidth Product (IC = 10mA, VCE= 20V, f = 100MHz)	fT	300	-	-	MHz
Output Capacitance (VCB = 5.0 V, IE = 0, f = 1.0 MHz)	Cobo	-	-	4	pF
Input Capacitance (VEB = 0.5 V, IC = 0, f = 1.0 MHz)	Cibo	-	-	8	pF

SWITCHING CHARACTERISTICS

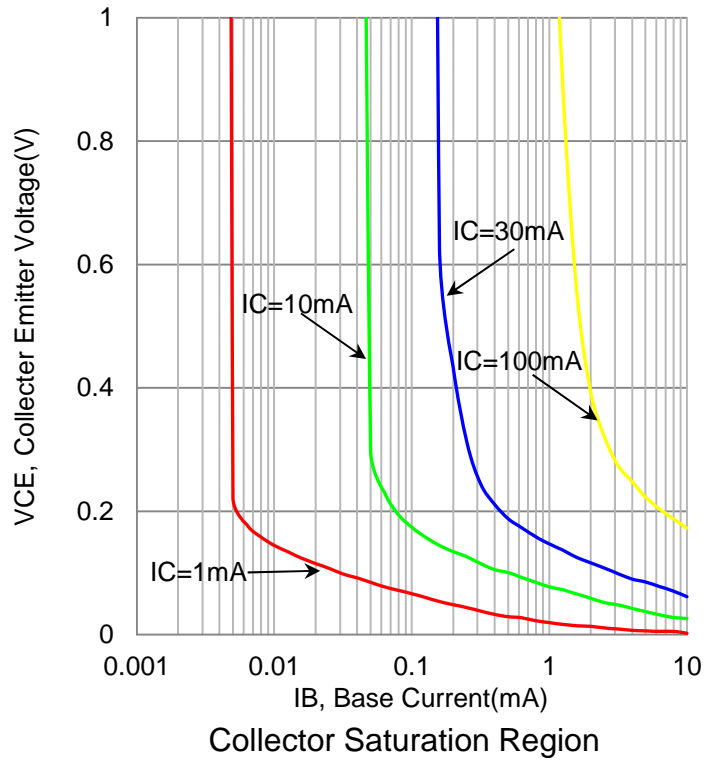
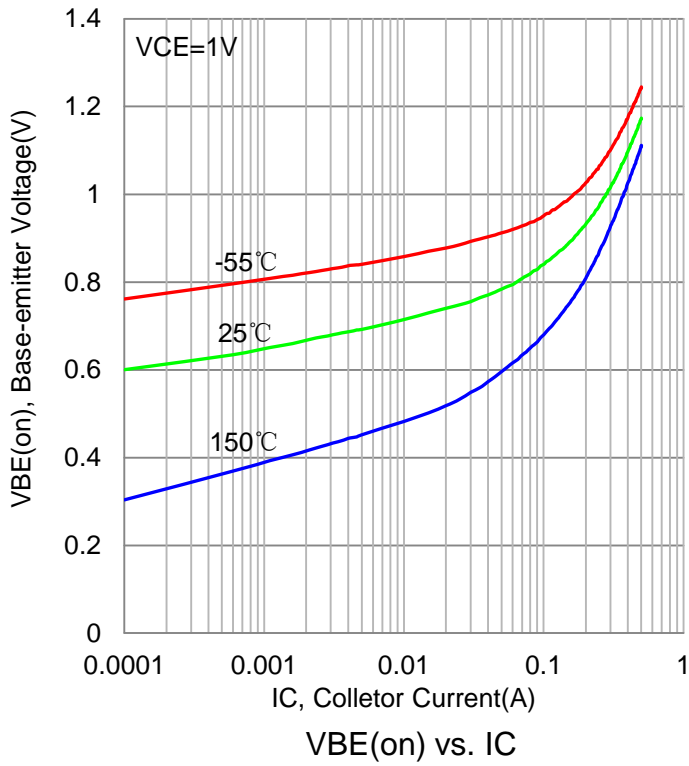
Delay Time	(VCC = 3.0 V, VBE=-0.5V, IC = 10mA, IB1 = 1.0 mA)	td	-	-	35	ns
Rise Time		tr	-	-	35	
Storage Time	(VCC = 3.0 V, IC = 10 mA, IB1 = IB2 = 1.0 mA)	ts	-	-	200	
Fall Time		tf	-	-	50	

3.Pulse Test: Pulse Width ≤300 μs, Duty Cycle ≤2.0%.

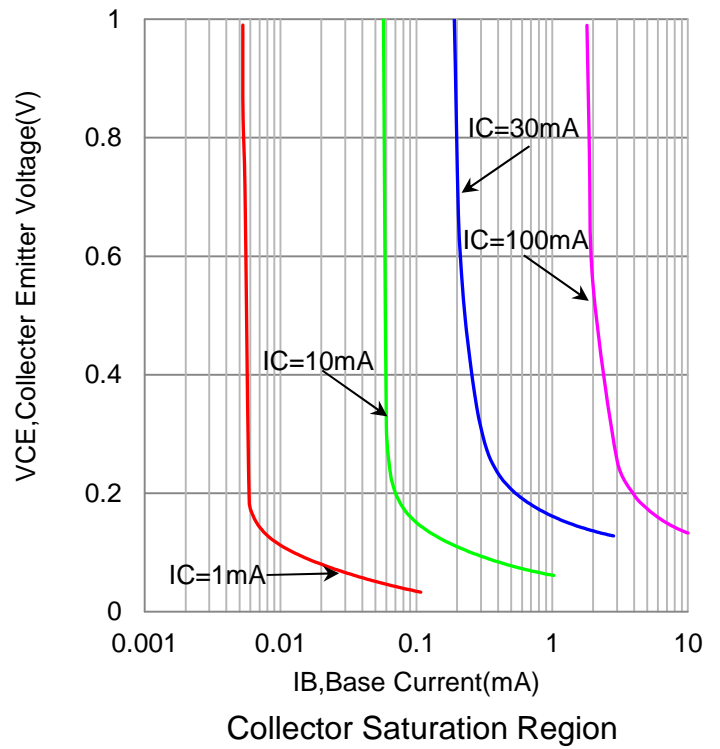
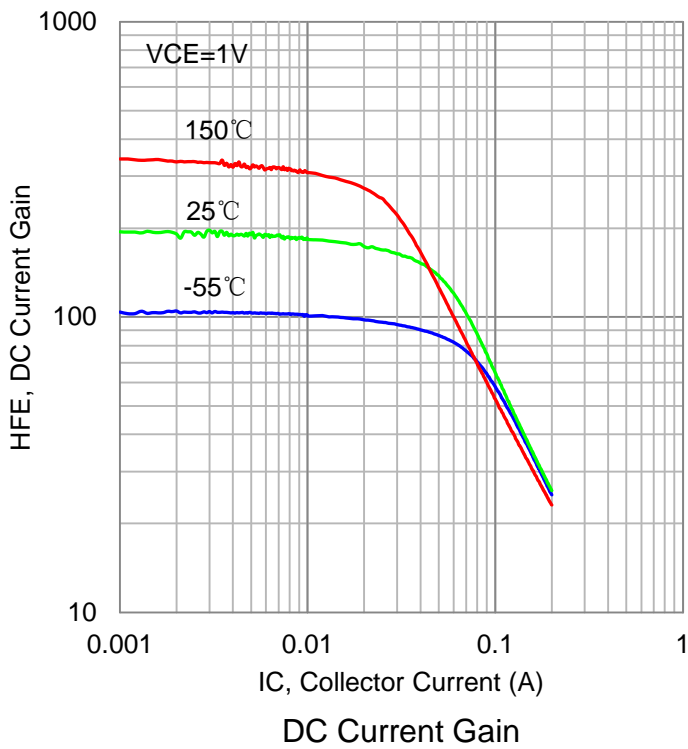
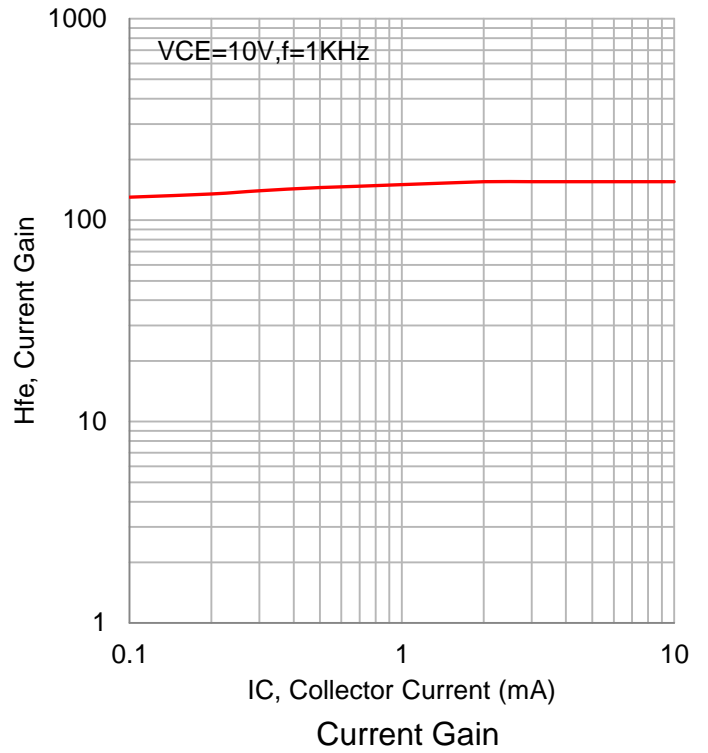
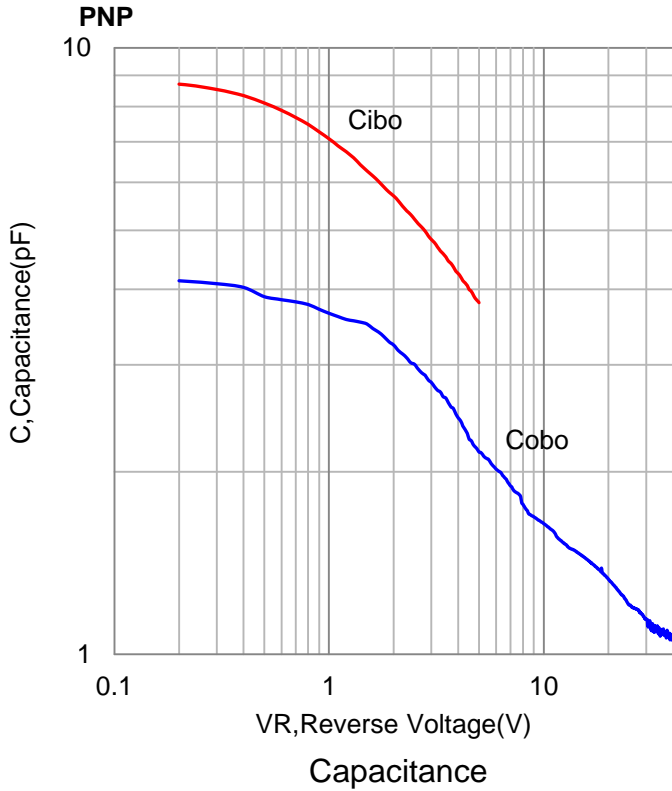
6.ELECTRICAL CHARACTERISTICS CURVES



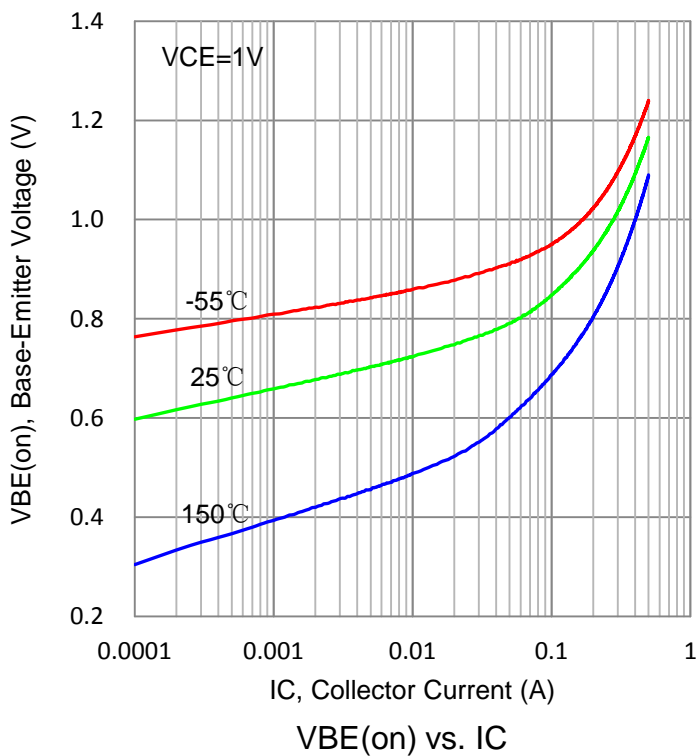
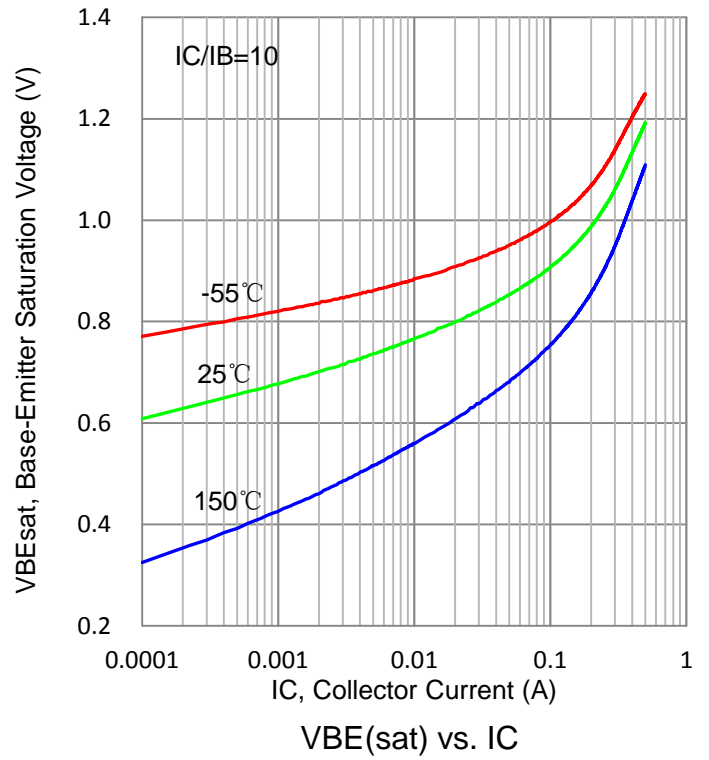
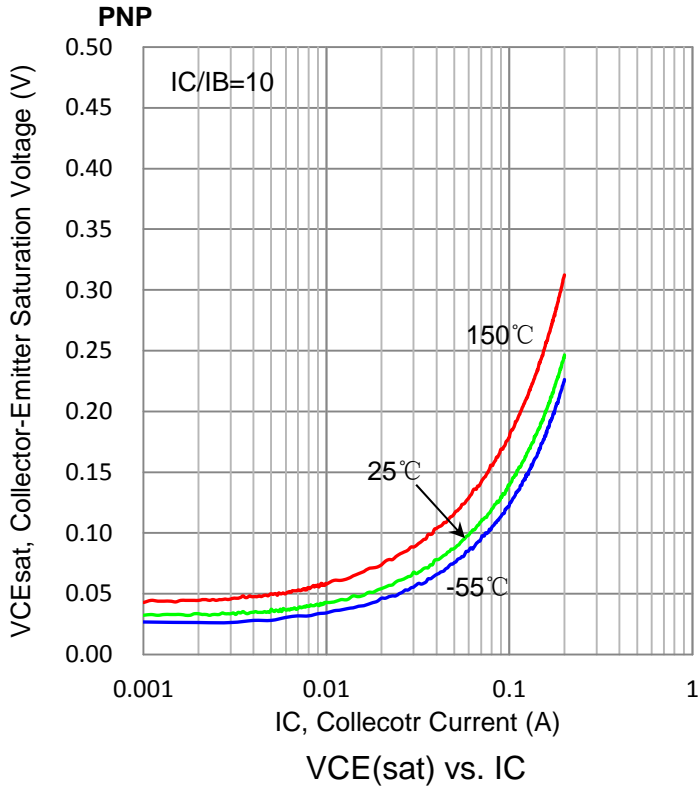
6.ELECTRICAL CHARACTERISTICS CURVES
NPN



6.ELECTRICAL CHARACTERISTICS CURVES



6. ELECTRICAL CHARACTERISTICS CURVES



DISCLAIMER

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