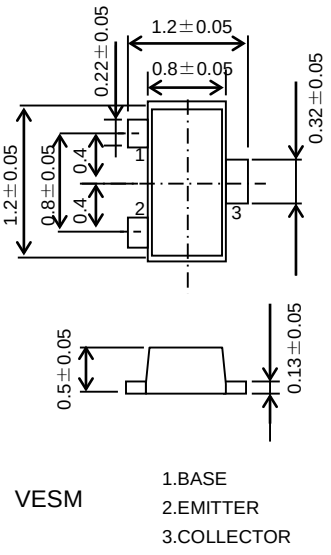
TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT Process) (Bias Resistor built-in Transistor)

RN2114MFV, RN2115MFV, RN2116MFV RN2117MFV, RN2118MFV

Switching Applications
Inverter Circuit Applications
Interface Circuit Applications
Driver Circuit Applications

- Ultra-small package, suited to very high density mounting
- Incorporating a bias resistor into the transistor reduces the number of parts, so enabling the manufacture of ever more compact equipment and lowering assembly cost.
- A wide range of resistor values is available for use in various circuits.
- Complementary to RN1114MFV to RN1118MFV

Unit: mm



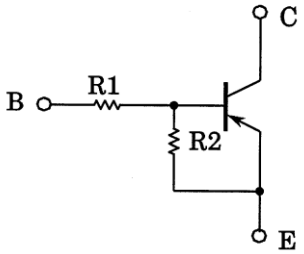
VESM

1.BASE
2.EMITTER
3.COLLECTOR

JEDEC	—
JEITA	—
TOSHIBA	2-1L1A

Weight: 1.5 mg (typ.)

Equivalent Circuit and Bias Resistor Values



Type No.	R1 (kΩ)	R2 (kΩ)
RN2114MFV	1	10
RN2115MFV	2.2	10
RN2116MFV	4.7	10
RN2117MFV	10	4.7
RN2118MFV	47	10

Absolute Maximum Ratings (Ta = 25°C)

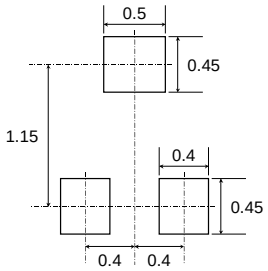
Characteristic		Symbol	Rating	Unit
Collector-base voltage	RN2114MFV to RN2118MFV	V_{CBO}	−50	V
Collector-emitter voltage		V_{CEO}	−50	V
Emitter-base voltage	RN2114MFV	V_{EBO}	−5	V
	RN2115MFV		−6	
	RN2116MFV		−7	
	RN2117MFV		−15	
	RN2118MFV		−25	
Collector current	RN2114MFV to RN2118MFV	I_C	−100	mA
Collector power dissipation		P_C(Note1)	150	mW
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note1: Mounted on FR4 board (25.4 mm × 25.4 mm × 1.6mmt)

Start of commercial production
2005-09

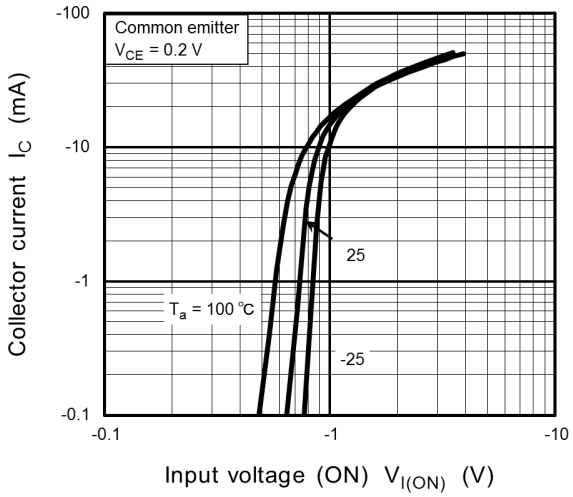
Land Pattern Example unit: mm



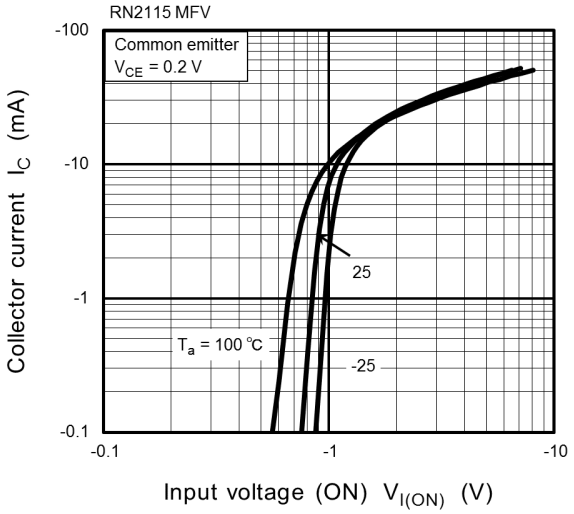
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	RN2114MFV to 2118MFV	I_{CBO}	V_{CB} = −50V, I_E = 0	—	—	−100	nA
		I_{CEO}	V_{CE} = −50V, I_B = 0	—	—	−500	
Emitter cut-off current	RN2114MFV	I_{EBO}	V_{EB} = −5V, I_C = 0	−0.35	—	−0.65	mA
	RN2115MFV		V_{EB} = −6V, I_C = 0	−0.37	—	−0.71	
	RN2116MFV		V_{EB} = −7V, I_C = 0	−0.36	—	−0.68	
	RN2117MFV		V_{EB} = −15V, I_C = 0	−0.78	—	−1.46	
	RN2118MFV		V_{EB} = −25V, I_C = 0	−0.33	—	−0.63	
DC current gain	RN2114MFV to 16MFV, 18MFV	h_{FE}	V_{CE} = −5V, I_C = −10mA	50	—	—	
	RN2117MFV			30	—	—	
Collector-emitter saturation voltage	RN2114MFV to 2118MFV	$V_{CE(sat)}$	I_C = −5mA, I_B = −0.5mA	—	−0.1	−0.3	V
Input voltage (ON)	RN2114MFV	$V_{I\ (ON)}$	V_{CE} = −0.2V, I_C = −5mA	−0.5	—	−2.0	V
	RN2115MFV			−0.6	—	−2.5	
	RN2116MFV			−0.7	—	−2.5	
	RN2117MFV			−1.5	—	−3.5	
	RN2118MFV			−2.5	—	−10.0	
Input voltage (OFF)	RN2114MFV	$V_{I\ (OFF)}$	V_{CE} = −5V, I_C = −0.1mA	−0.3	—	−0.9	V
	RN2115MFV			−0.3	—	−1.0	
	RN2116MFV			−0.3	—	−1.1	
	RN2117MFV			−0.3	—	−3.0	
	RN2118MFV			−0.5	—	−5.7	
Collector output capacitance	RN2114MFV to 2118MFV	C_{ob}	V_{CB} = −10V, I_E = 0, f = 1MHz	—	0.9	—	pF
Input resistor	RN2114MFV	R1	—	0.7	1.0	1.3	kΩ
	RN2115MFV			1.54	2.2	2.86	
	RN2116MFV			3.29	4.7	6.11	
	RN2117MFV			7.0	10.0	13.0	
	RN2118MFV			32.9	47	61.1	
Resistor ratio	RN2114MFV	R1/R2	—	—	0.1	—	
	RN2115MFV			—	0.22	—	
	RN2116MFV			—	0.47	—	
	RN2117MFV			—	2.13	—	
	RN2118MFV			—	4.7	—	

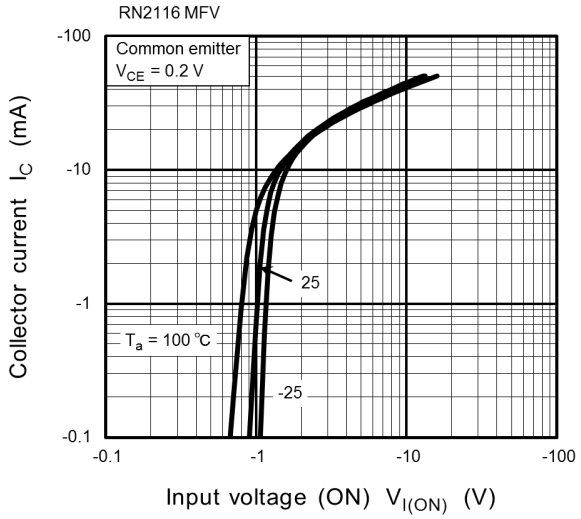
RN2114 MFV



RN2115 MFV



RN2116 MFV



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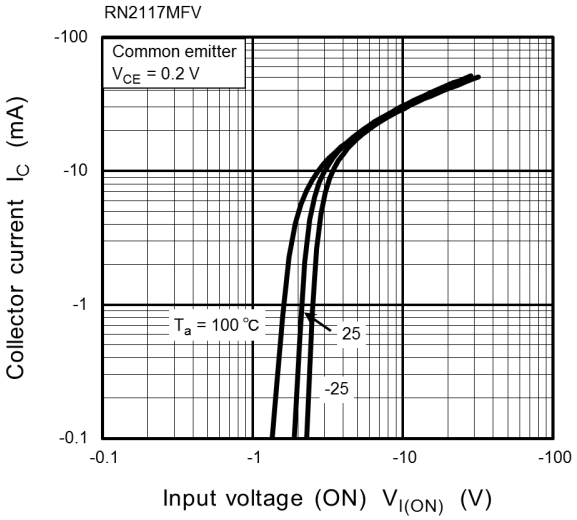
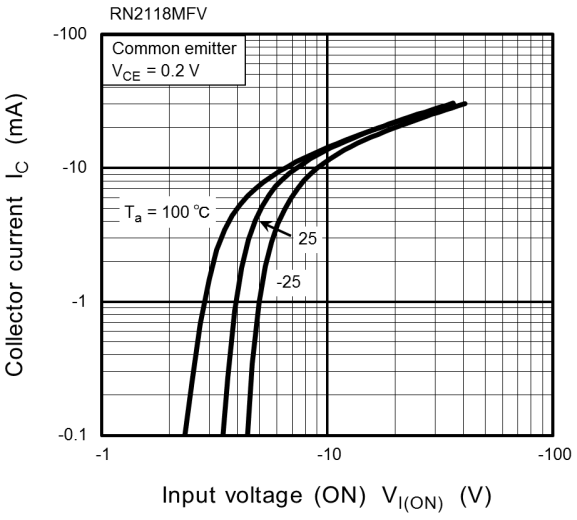


RN2118MFV



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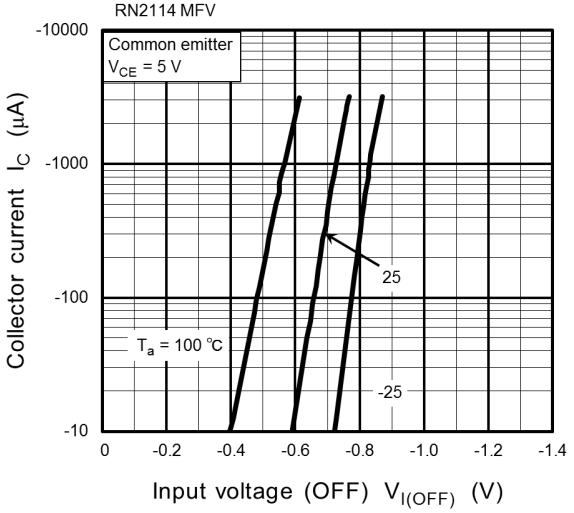

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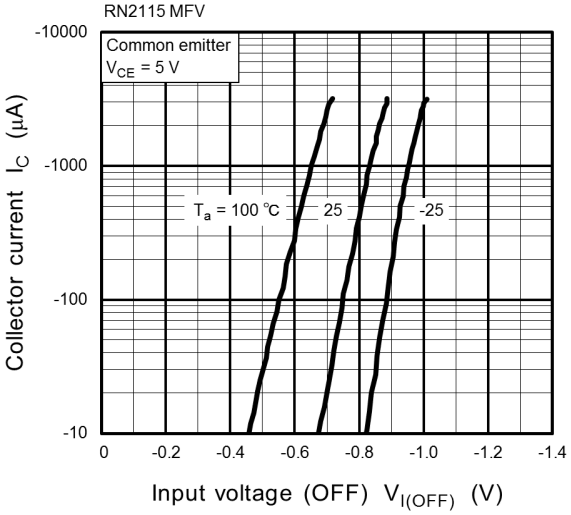
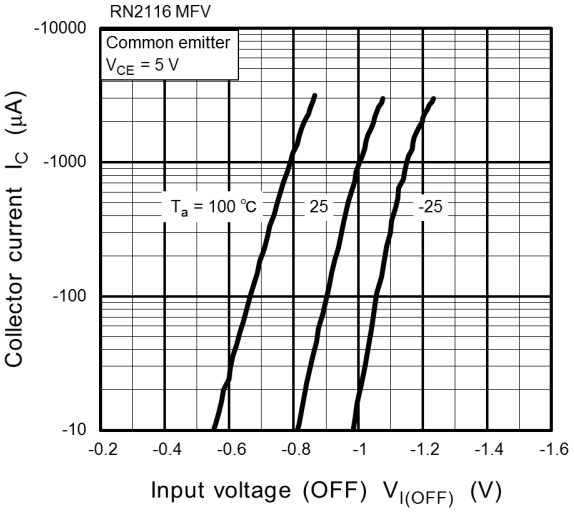


RN2116 MFV



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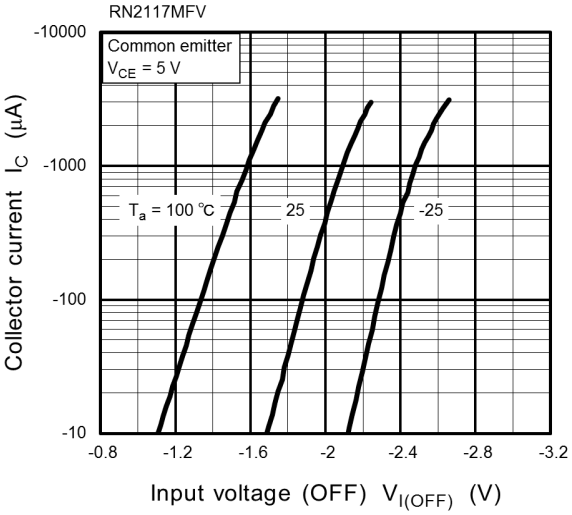

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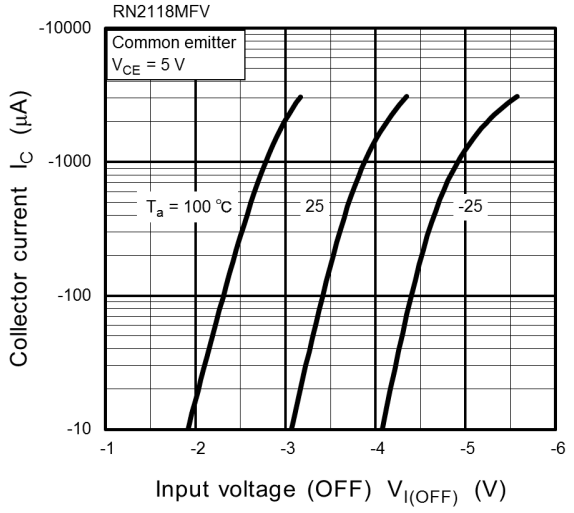
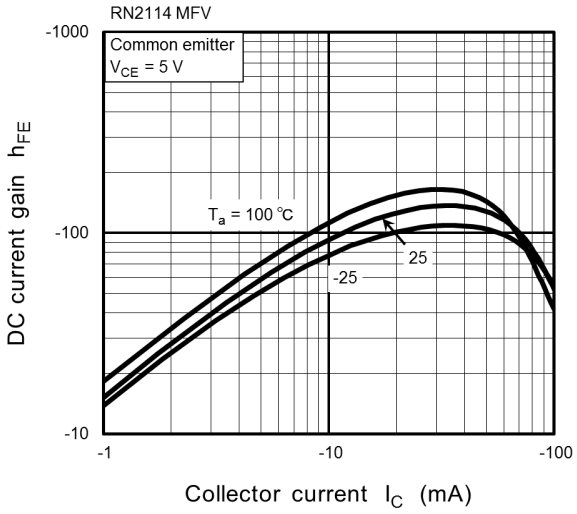
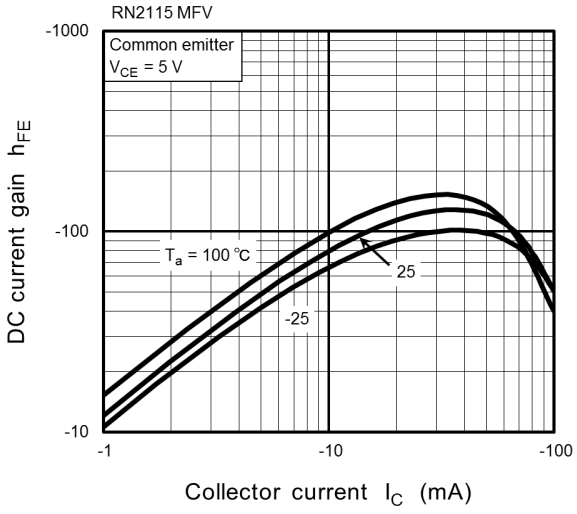
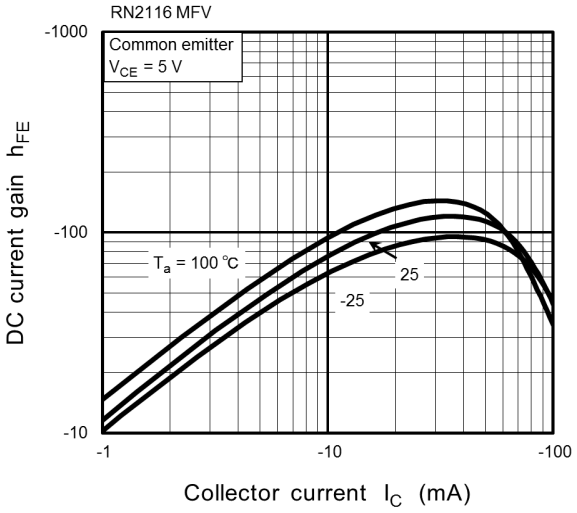
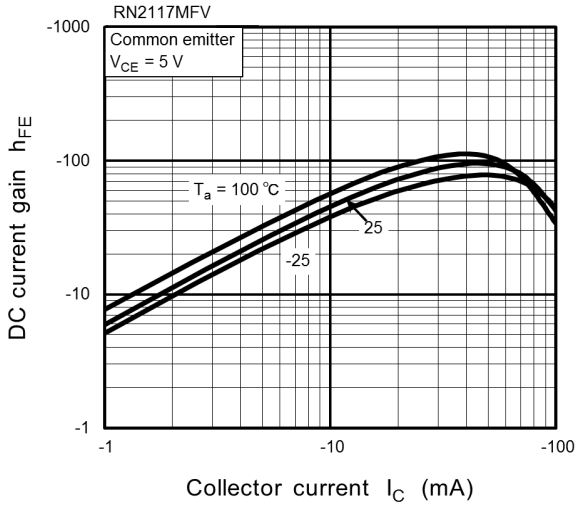
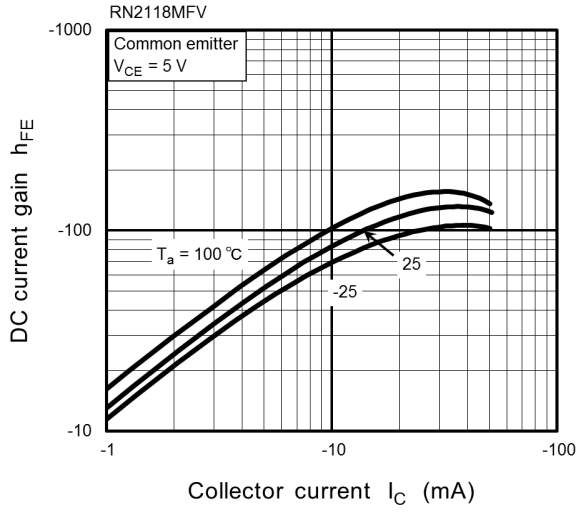


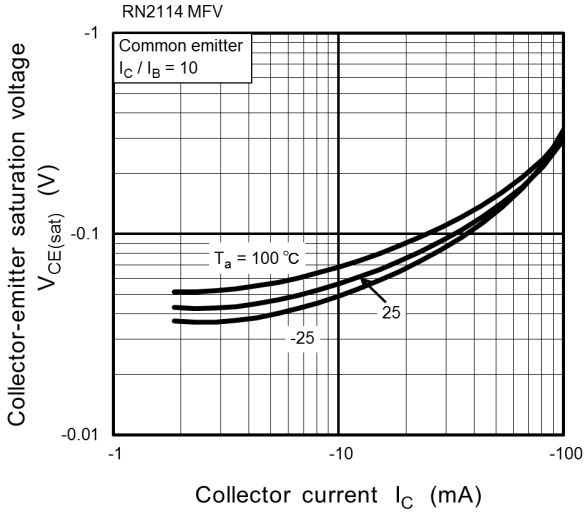

RN2114 MFV
Common emitter
V_{CE} = 5 V
T_a = 100 ℃
25
-25
DC current gain h_{FE}
Collector current I_C (mA)
-1000
-100
-10
-1
-10
-100

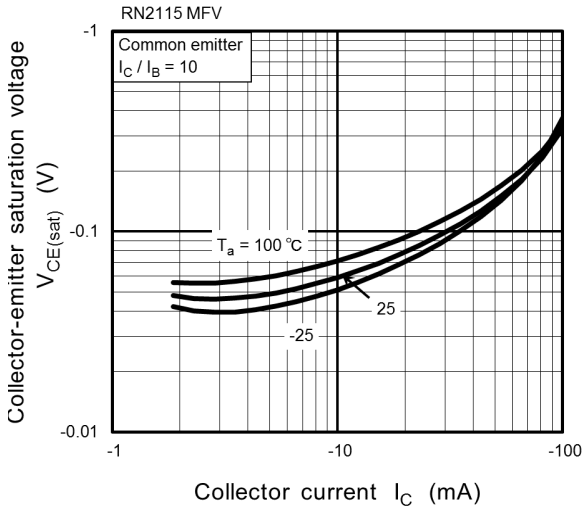

RN2115 MFV
Common emitter
V_{CE} = 5 V
T_a = 100 ℃
25
-25
DC current gain h_{FE}
Collector current I_C (mA)
-1000
-100
-10
-1
-10
-100

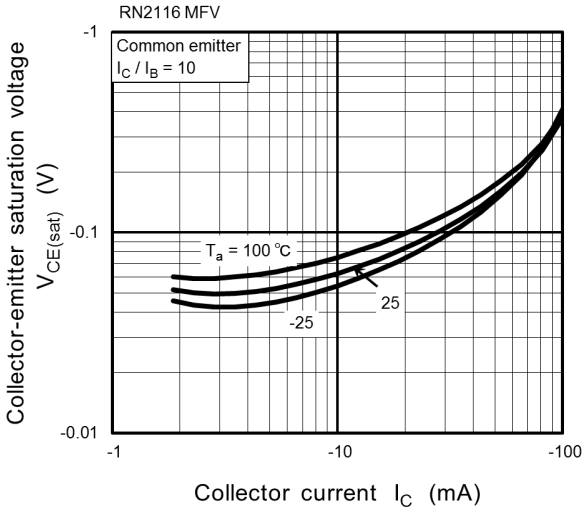

RN2116 MFV
Common emitter
V_{CE} = 5 V
T_a = 100 ℃
25
-25
DC current gain h_{FE}
Collector current I_C (mA)
-1000
-100
-10
-1
-10
-100

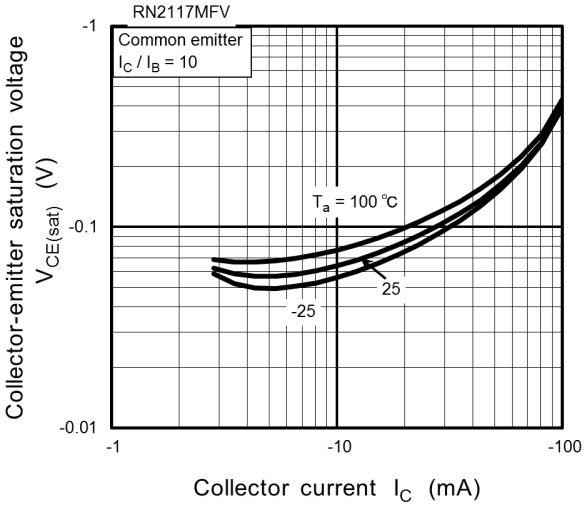

RN2117MFV
Common emitter
V_{CE} = 5 V
T_a = 100 ℃
25
-25
DC current gain h_{FE}
Collector current I_C (mA)
-1000
-100
-10
-1
-10
-100

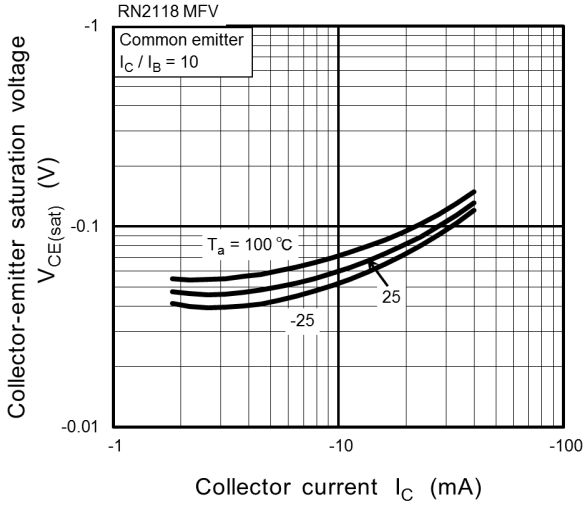

RN2118MFV
Common emitter
V_{CE} = 5 V
T_a = 100 ℃
25
-25
DC current gain h_{FE}
Collector current I_C (mA)
-1000
-100
-10
-1
-10
-100

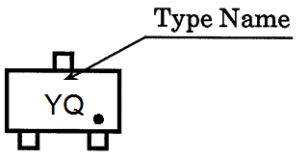
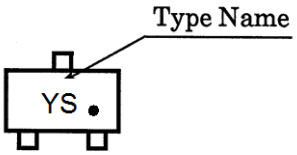
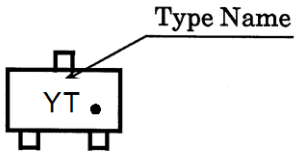
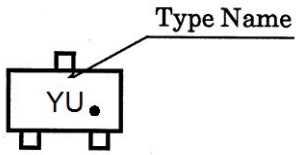
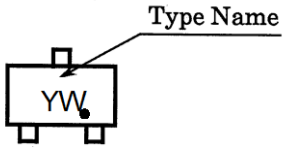

RN2114 MFV
Common emitter
$I_C / I_B = 10$
T_a = 100 °C
25
-25
Collector-emitter saturation voltage $V_{CE(sat)}$ (V)
Collector current I_C (mA)
-1
-0.1
-0.01
-1
-10
-100


RN2115 MFV
Common emitter
$I_C / I_B = 10$
T_a = 100 °C
25
-25
Collector-emitter saturation voltage $V_{CE(sat)}$ (V)
Collector current I_C (mA)
-1
-0.1
-0.01
-1
-10
-100


RN2116 MFV
Common emitter
$I_C / I_B = 10$
T_a = 100 °C
25
-25
Collector-emitter saturation voltage $V_{CE(sat)}$ (V)
Collector current I_C (mA)
-1
-0.1
-0.01
-1
-10
-100


RN2117MFV
Common emitter
$I_C / I_B = 10$
T_a = 100 °C
25
-25
Collector-emitter saturation voltage $V_{CE(sat)}$ (V)
Collector current I_C (mA)
-1
-0.1
-0.01
-1
-10
-100


RN2118 MFV
Common emitter
$I_C / I_B = 10$
T_a = 100 °C
25
-25
Collector-emitter saturation voltage $V_{CE(sat)}$ (V)
Collector current I_C (mA)
-1
-0.1
-0.01
-1
-10
-100

Type Name	Marking
RN2114MFV	
RN2115MFV	
RN2116MFV	
RN2117MFV	
RN2118MFV	

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