

TOSHIBA Multi-chip Device Silicon P Channel MOS Type (U-MOSIV) /Silicon NPN Epitaxial Type

TPCP8J01

Notebook PC Applications

Portable Equipment Applications

- Lead(Pb)-Free
- Small mounting area due to small and thin package
- Low drain-source ON resistance: P Channel $R_{DS(ON)} = 27 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: P Channel $|Y_{fs}| = 9.6 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ ($V_{DS} = -32 \text{ V}$)
- Enhancement-mode: P Channel $V_{th} = -0.8$ to -2.0 V
($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

MOSFET

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-32	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-32	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	-5.5	A
	Pulse (Note 1)	I_{DP}	-22	
Drain power dissipation ($t = 5 \text{ s}$) (Note 2a)		P_D	2.14	W
Drain power dissipation ($t = 5 \text{ s}$) (Note 2b)		P_D	1.06	W
Single pulse avalanche energy (Note 3)		E_{AS}	5.8	mJ
Avalanche current		I_{AR}	-3	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.21	mJ

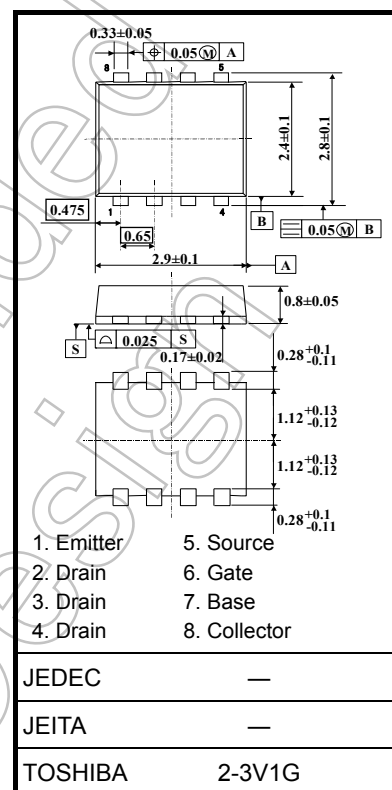
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Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	50	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage		V_{EBO}	6	V
Collector current	DC (Note 1)	I_C	100	mA
Collector power dissipation		P_C	200	mW

Note: For Notes 1 to 5, refer to the next page.

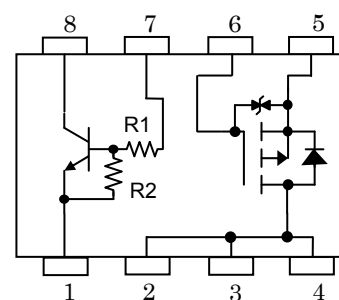
This transistor is an electrostatic-sensitive device. Handle with caution.

Unit: mm

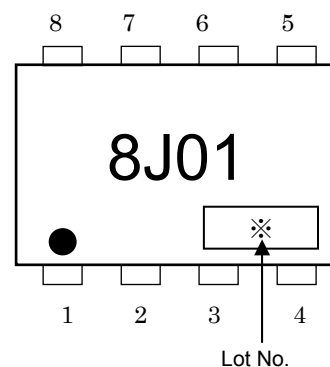


Weight: 0.011 g (typ.)

Circuit Configuration



Marking (Note5)



Common Absolute Maximum Ratings (Ta=25°C)

Characteristics	Symbol	Rating	Unit
Junction temperature	T_J	150	°C
Storage temperature range	T_{stg}	-55~150	°C

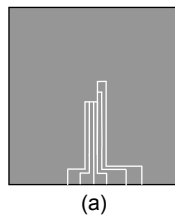
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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.).

Thermal Characteristics

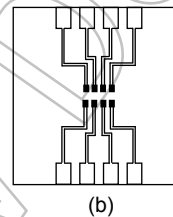
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	$R_{th(ch-a)}$	58.4	°C/W
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	$R_{th(ch-a)}$	117.9	°C/W

Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)



FR-4
25.4 × 25.4 × 0.8
(Unit: mm)



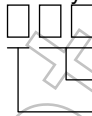
FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: $V_{DD} = -24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.2\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -3.0\text{ A}$

Note 4: Repetitive rating: pulse width limited by maximum channel temperature

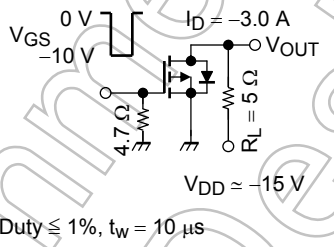
Note 5: "•" on the lower left of the marking indicates Pin 1.

※ Weekly code (three digits):



Week of manufacture
(01 for the first week of the year, continues up to 52 or 53)
Year of manufacture
(The last digit of the calendar year)

Electrical Characteristics (Ta = 25°C)
MOSFET

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = -32 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-32	—	—	V
		$V_{(BR) DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 20 \text{ V}$	-15	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	-0.8	—	-2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -4 \text{ V}, I_D = -3.0 \text{ A}$	—	38	49	$\text{m}\Omega$
			$V_{GS} = -10 \text{ V}, I_D = -3.0 \text{ A}$	—	27	35	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -3.0 \text{ A}$	4.8	9.6	—	S
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	1760	—	pF
Reverse transfer capacitance		C_{rss}		—	200	—	
Output capacitance		C_{oss}		—	210	—	
Switching time	Rise time	t_r		—	2.8	—	ns
	Turn-on time	t_{on}		—	12	—	
	Fall time	t_f		—	22	—	
	Turn-off time	t_{off}		—	90	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -24 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -5.5 \text{ A}$	—	34	—	nC
Gate-source charge 1		Q_{gs1}		—	4.7	—	
Gate-drain ("miller") charge		Q_{gd}		—	7.2	—	

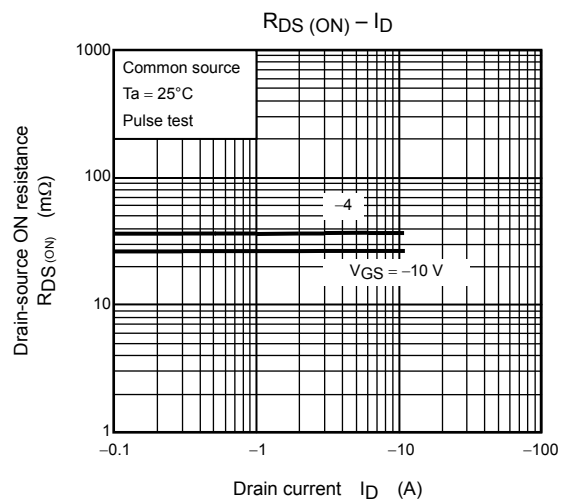
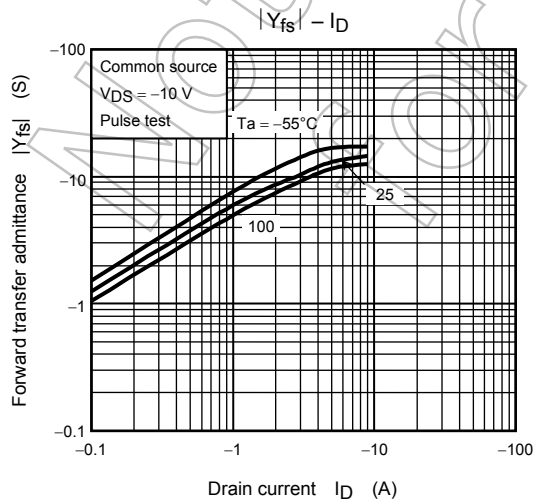
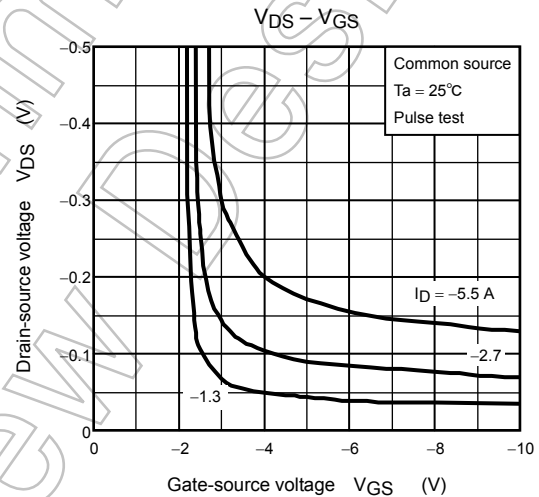
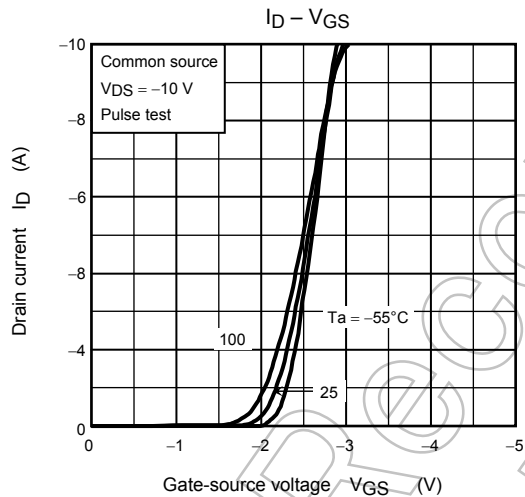
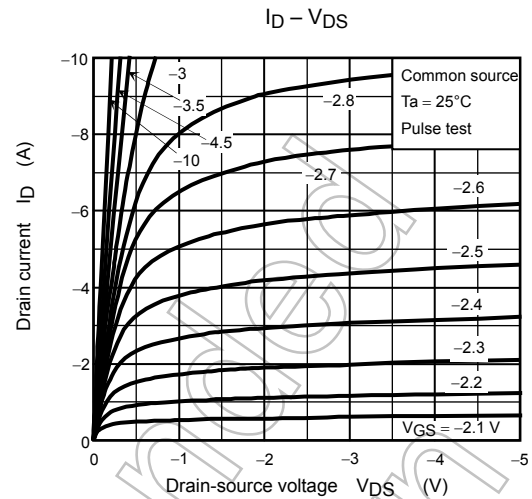
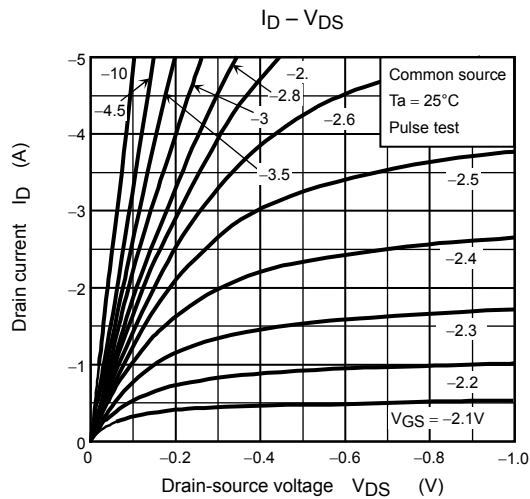
Source-Drain Ratings and Characteristics (Ta = 25°C)

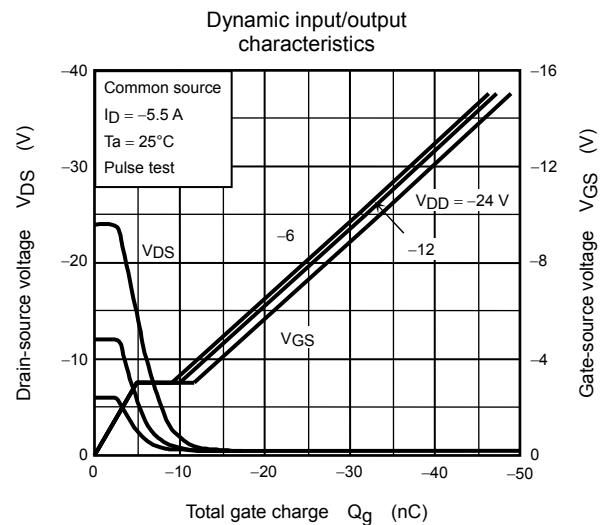
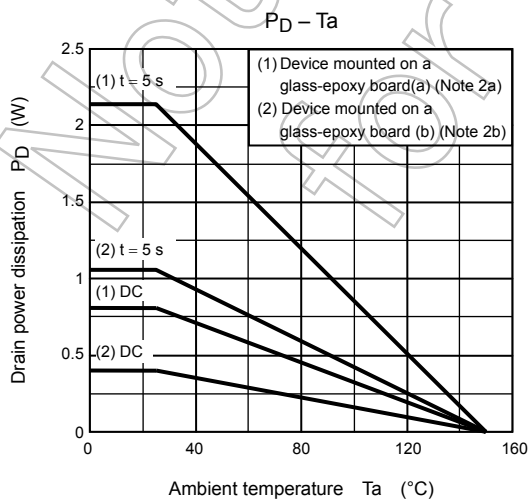
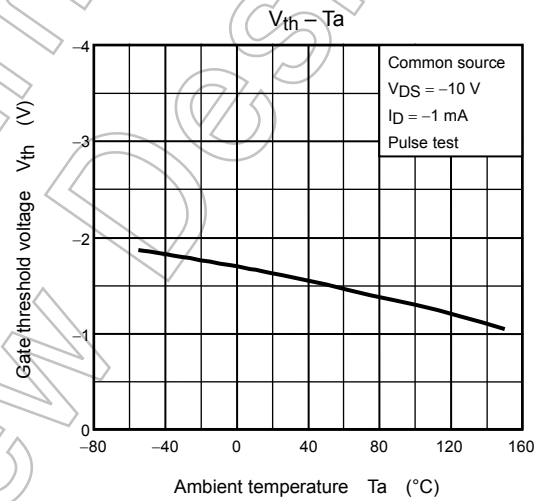
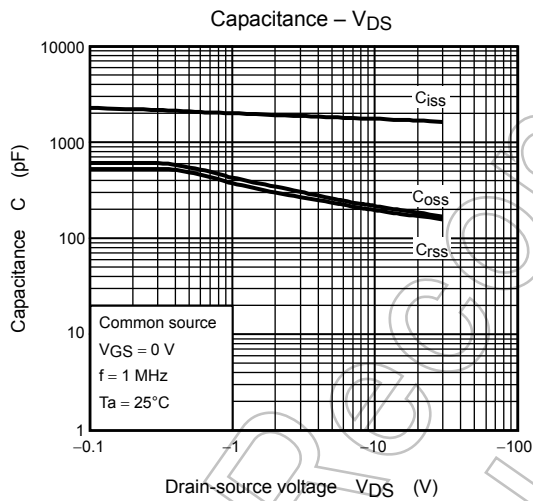
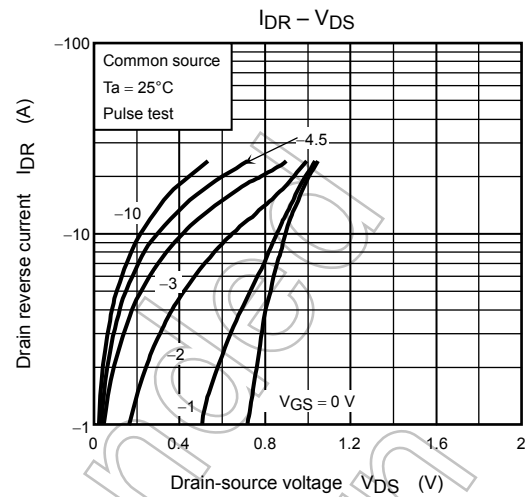
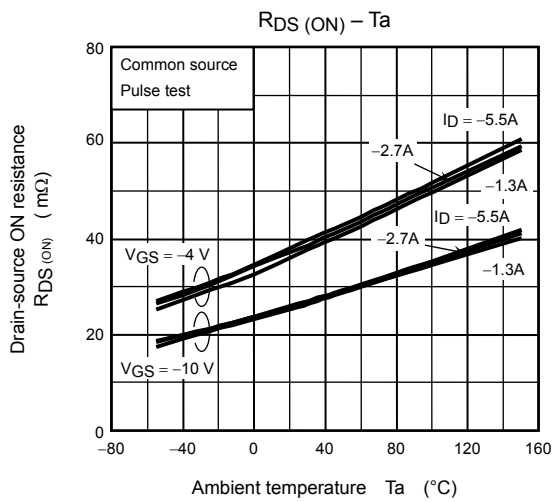
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current (Pulse) (Note 1)	I_{DRP}	—	—	—	-22	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = -5.5 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V

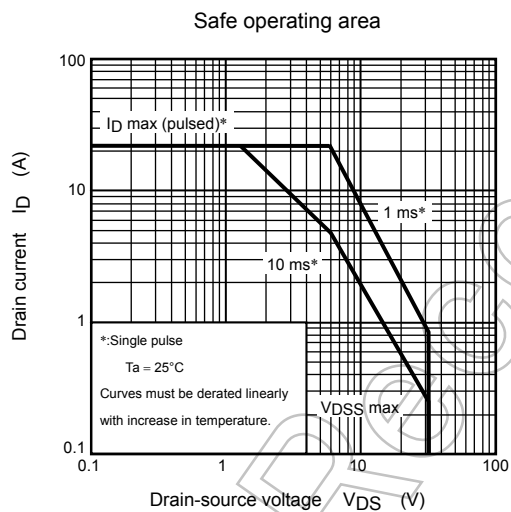
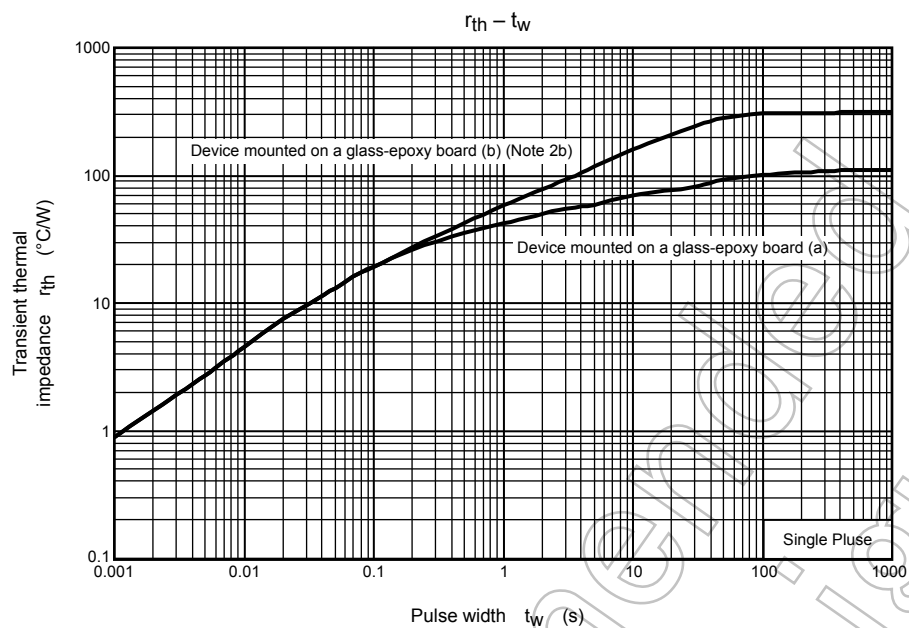
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Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	100	nA
	I_{CEO}	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	500	
Emitter cut-off current	I_{EBO}	$V_{EB} = 6\text{ V}, I_C = 0$	0.081	—	0.15	mA
DC current gain	h_{FE}	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$	80	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 5\text{ mA}, I_B = 0.25\text{ mA}$	—	0.1	0.3	V
Input voltage (ON)	$V_I(ON)$	$V_{CE} = 0.2\text{ V}, I_C = 5\text{ mA}$	0.7	—	1.8	V
Input voltage (OFF)	$V_I(OFF)$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ mA}$	0.5	—	1.0	V
Transition frequency	f_T	$V_{CE} = 10\text{ V}, I_C = 5\text{ mA}$	—	250	—	MHz
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	3	6	pF
Input resistor	R_1	—	7	10	13	k Ω
Resistor ratio	R_1/R_2	—	0.191	0.213	0.232	

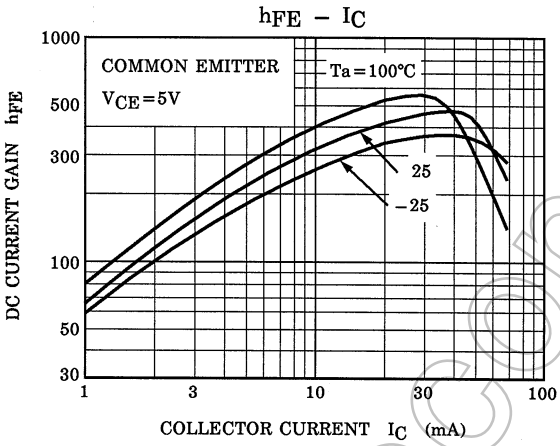
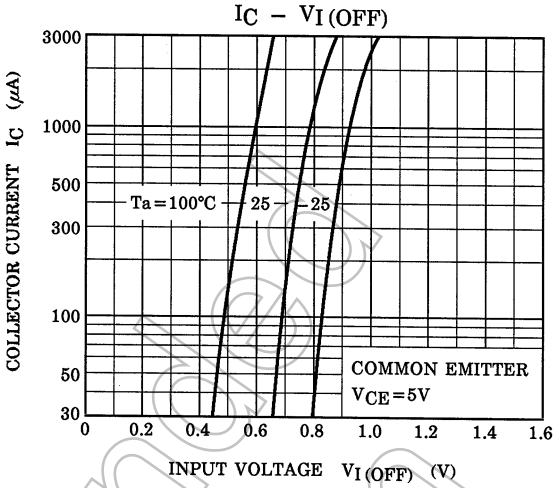
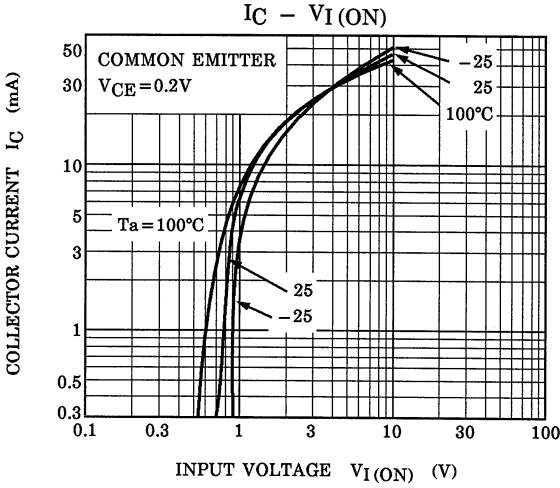
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