

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:  $I_{DSS} = -10\text{ }\mu\text{A}$  (max)( $V_{DS} = -32\text{ V}$ )
- Enhancement-mode: P Channel  $V_{th} = -0.8\text{ to }-2.0\text{ V}$   
( $V_{DS} = -10\text{ V}$ ,  $I_D = -1\text{ mA}$ )

### 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		$V_{GSS}$	$\pm 20$	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

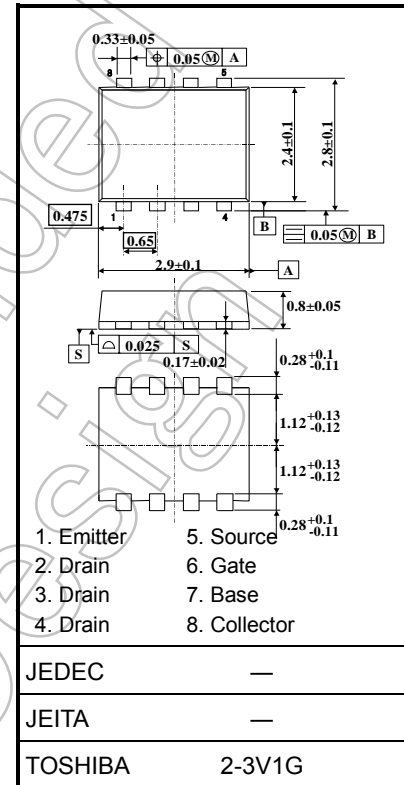
#### BRT

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.

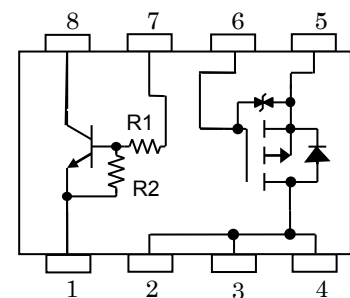
This transistor is an electrostatic-sensitive device. Handle with caution.

Unit: mm

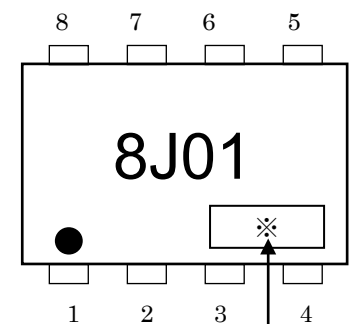


Weight: 0.011 g (typ.)

### Circuit Configuration



### Marking (Note5)



Lot No.

## Common Absolute Maximum Ratings (Ta=25°C)

Characteristics	Symbol	Rating	Unit
Junction temperature	T <sub>J</sub>	150	°C
Storage temperature range	T <sub>stg</sub>	-55~150	°C

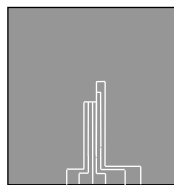
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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 <sub>th (ch-a)</sub>	58.4	°C/W
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	R <sub>th (ch-a)</sub>	117.9	°C/W

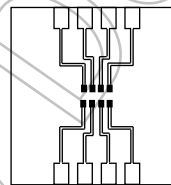
Note 1: Ensure that the channel temperature does not exceed 150°C.

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



(a)

FR-4  
25.4 × 25.4 × 0.8  
(Unit: mm)



(b)

FR-4  
25.4 × 25.4 × 0.8  
(Unit: mm)

Note 3: VDD = -24 V, T<sub>ch</sub> = 25°C (initial), L = 0.2 mH, R<sub>G</sub> = 25 Ω, I<sub>AR</sub> = -3.0 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		IGSS	VGS = ±16 V, VDS = 0 V	—	—	±10	μA
Drain cut-off current		IDSS	VDS = -32 V, VGS = 0 V	—	—	-10	μA
Drain-source breakdown voltage		V(BR)DSS	ID = -10 mA, VGS = 0 V	-32	—	—	V
		V(BR)DSX	ID = -10 mA, VGS = 20 V	-15	—	—	
Gate threshold voltage		Vth	VDS = -10 V, ID = -1 mA	-0.8	—	-2.0	V
Drain-source ON resistance		RDS(ON)	VGS = -4 V, ID = -3.0 A	—	38	49	mΩ
			VGS = -10 V, ID = -3.0 A	—	27	35	
Forward transfer admittance		Yfs	VDS = -10 V, ID = -3.0 A	4.8	9.6	—	S
Input capacitance		Ciss	VDS = -10 V, VGS = 0 V, f = 1 MHz	—	1760	—	pF
Reverse transfer capacitance		Crss		—	200	—	
Output capacitance		Coss		—	210	—	
Switching time	Rise time	tr		—	2.8	—	ns
	Turn-on time	ton		—	12	—	
	Fall time	tf		—	22	—	
	Turn-off time	toff		Duty ≤ 1%, tw = 10 μs	—	90	
Total gate charge (gate-source plus gate-drain)		Qg	VDD ≈ -24 V, VGS = -10 V, ID = -5.5 A	—	34	—	nC
Gate-source charge 1		Qgs1		—	4.7	—	
Gate-drain ("miller") charge		Qgd		—	7.2	—	

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

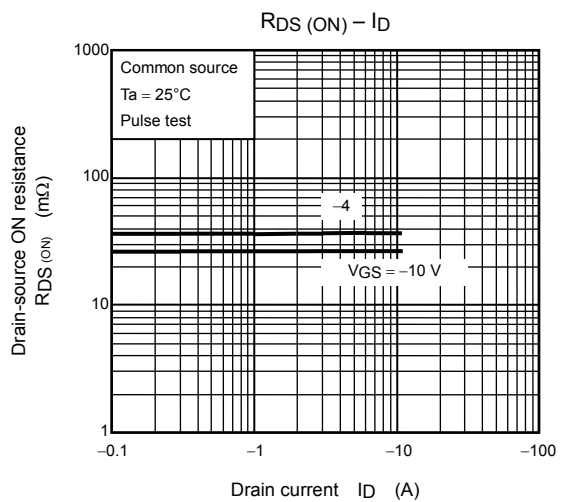
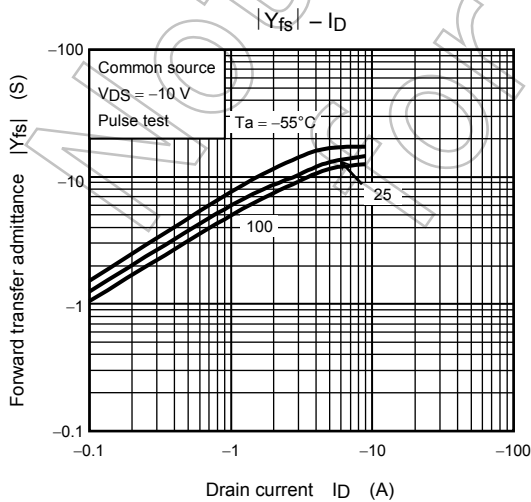
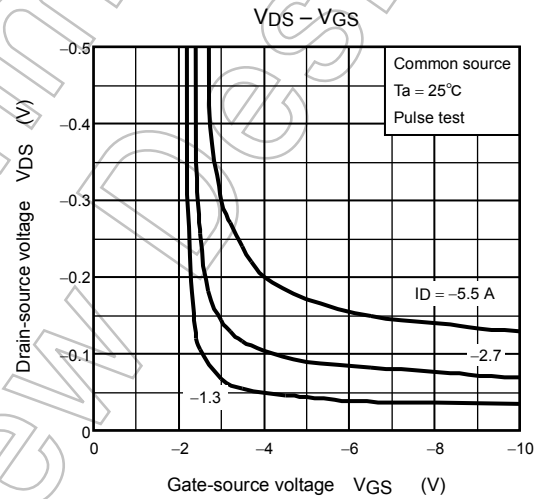
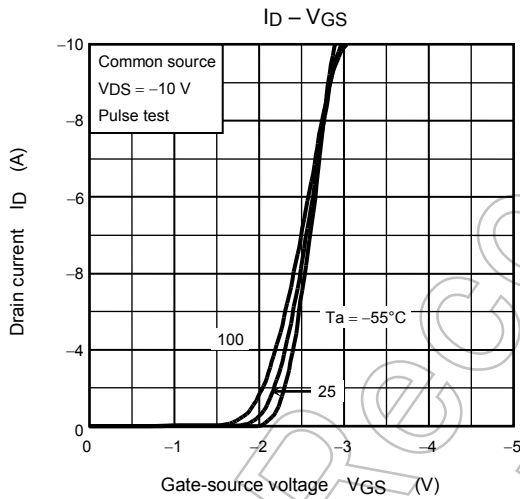
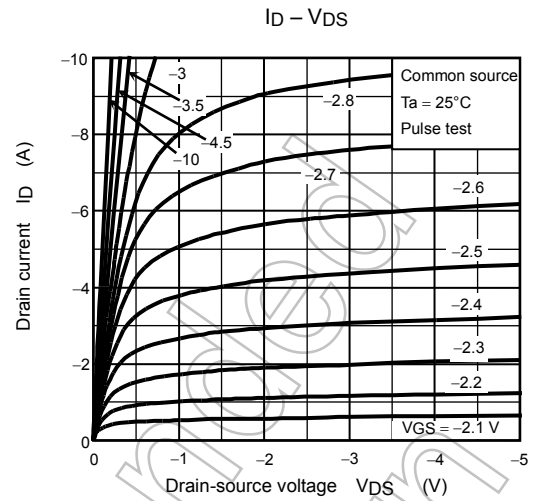
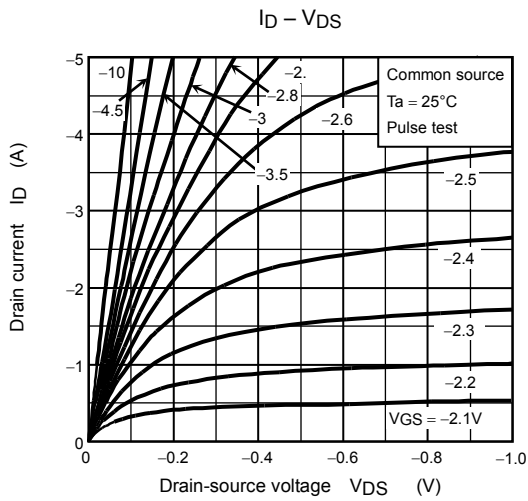
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current (Pulse) (Note 1)	IDRP	—	—	—	-22	A
Forward voltage (diode)	VDSF	IDR = -5.5 A, VGS = 0 V	—	—	1.2	V

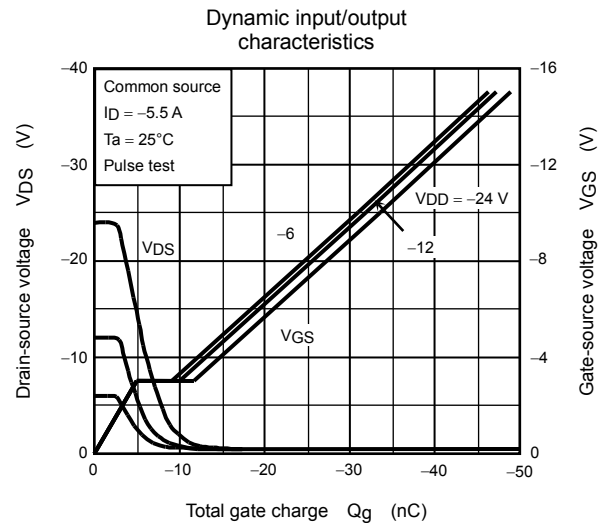
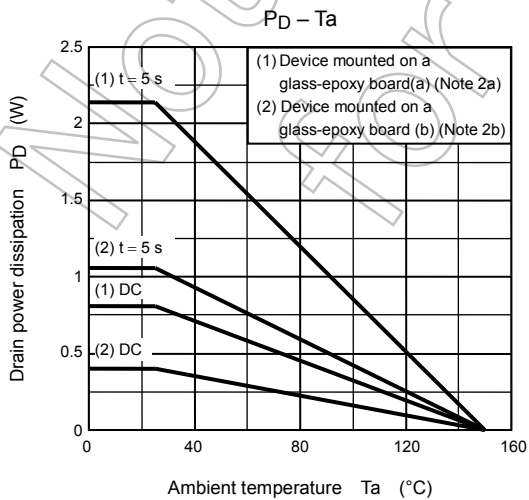
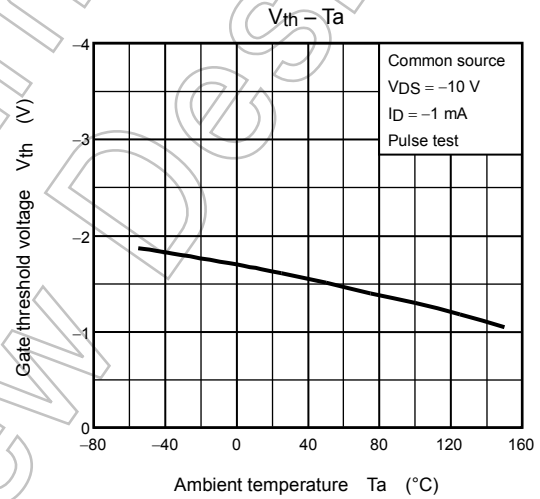
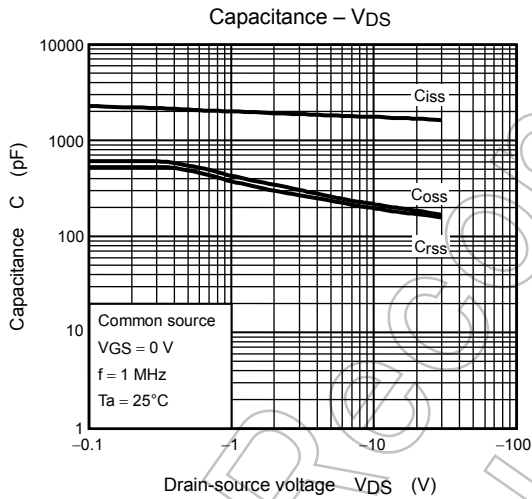
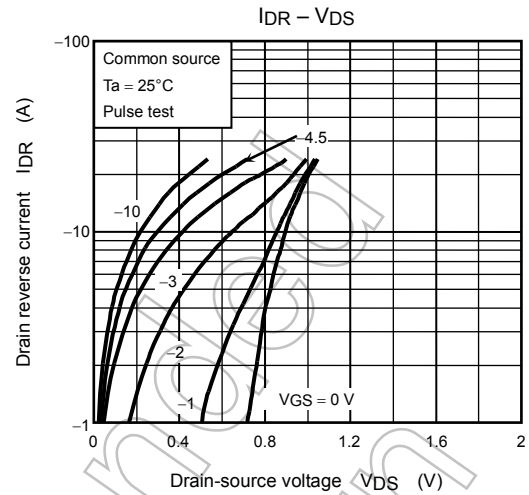
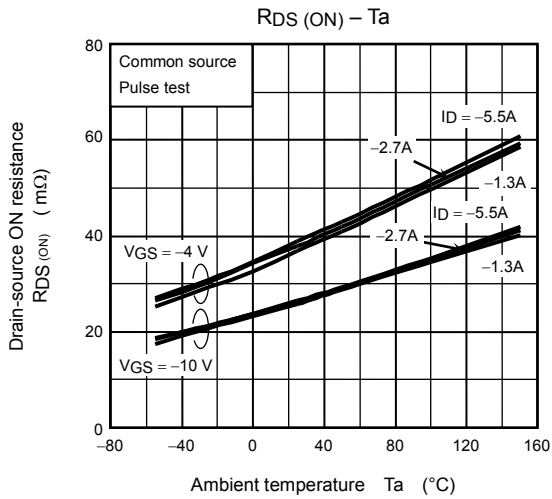
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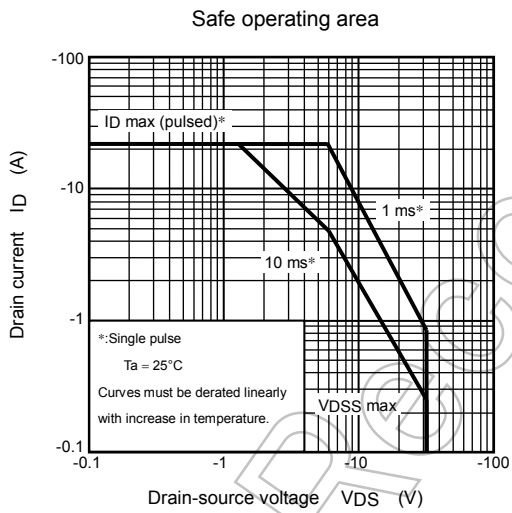
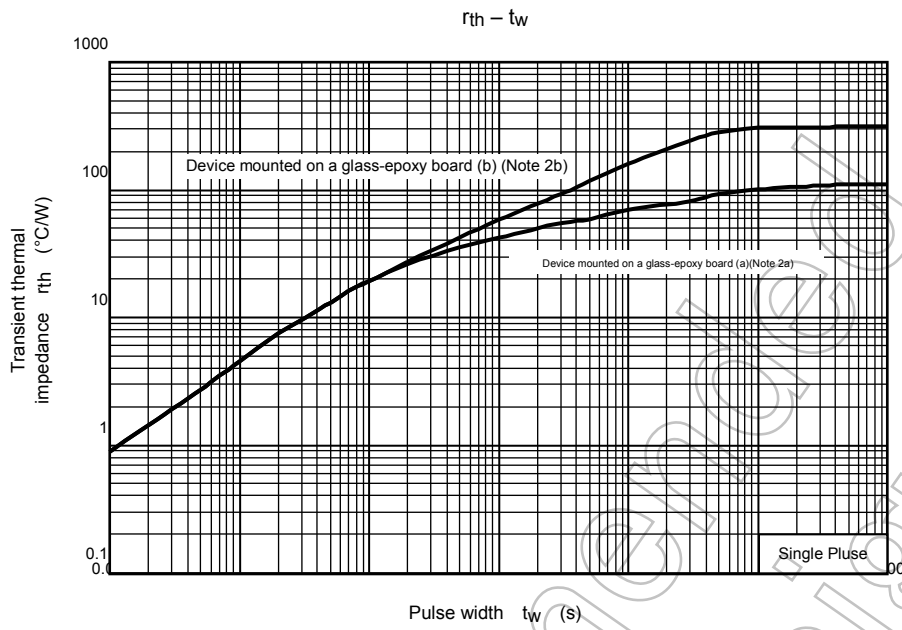
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	ICBO	V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0	—	—	100	nA
	ICEO	V <sub>CB</sub> = 50 V, I <sub>E</sub> = 0	—	—	500	
Emitter cut-off current	IEBO	V <sub>EB</sub> = 6 V, I <sub>C</sub> = 0	0.081	—	0.15	mA
DC current gain	h <sub>FE</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 10 mA	80	—	—	
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 5 mA, I <sub>B</sub> = 0.25 mA	—	0.1	0.3	V
Input voltage (ON)	V <sub>I(ON)</sub>	V <sub>CE</sub> = 0.2 V, I <sub>C</sub> = 5 mA	0.7	—	1.8	V
Input voltage (OFF)	V <sub>I(OFF)</sub>	V <sub>CE</sub> = 5 V, I <sub>C</sub> = 0.1 mA	0.5	—	1.0	V
Transition frequency	f <sub>T</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5 mA	—	250	—	MHz
Collector output capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1 MHz	—	3	6	pF
Input resistor	R1	—	7	10	13	kΩ
Resistor ratio	R1/R2	—	0.191	0.213	0.232	

Not Recommended for New Designs

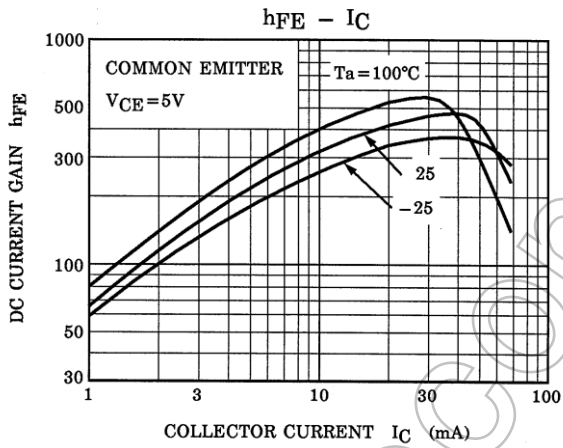
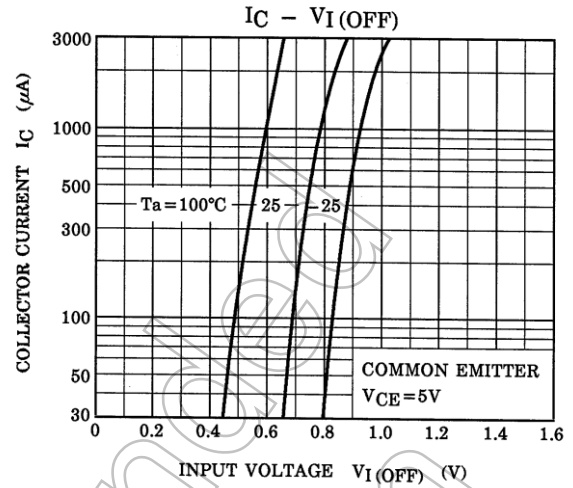
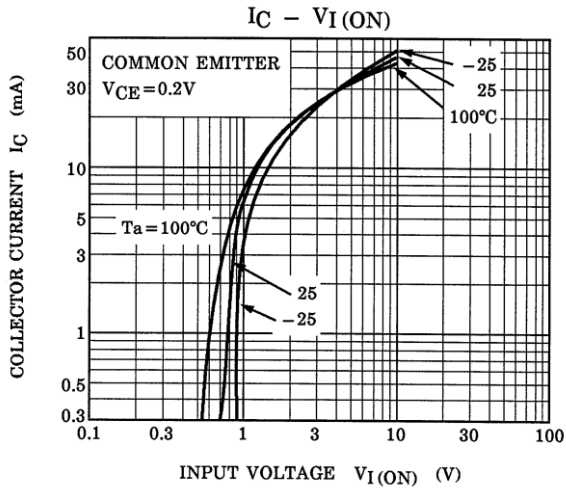
## MOSFET







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