

# GT45F123

## For PDP-TV Applications

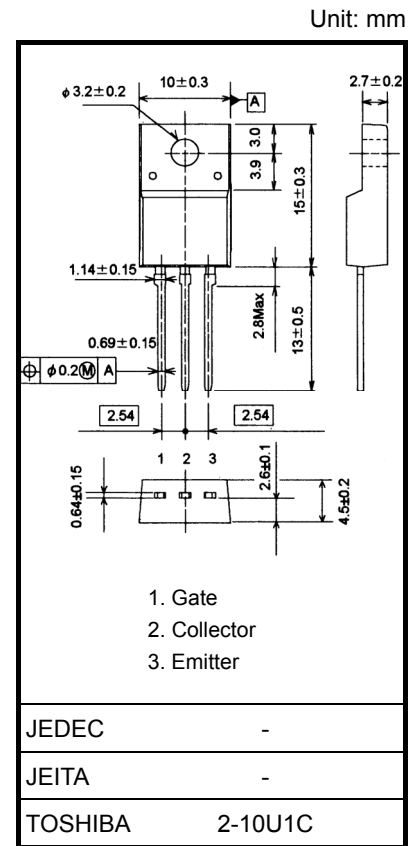
- 5th generation (trench gate structure) IGBT
- Enhancement-mode
- Low input capacitance:  $C_{ies} = 2700\text{pF}$  (typ.)
- Peak collector current:  $I_{CP} = 200\text{ A}$  (max)
- TO-220SIS package

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

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		$V_{CES}$	300	V
Gate-emitter voltage		$V_{GES}$	$\pm 30$	V
Collector current	Pulse (Note 1)	$I_{CP}$	200	A
Collector power dissipation	$T_c=25^\circ\text{C}$	$P_C$	26	W
	$T_a=25^\circ\text{C}$		2	
Junction temperature		$T_j$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

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).

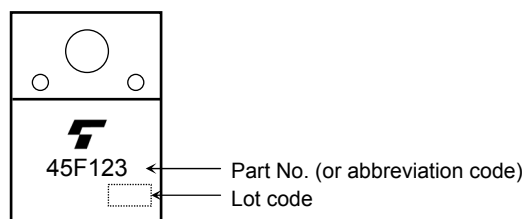


Weight: 2 g (typ.)

## Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal resistance, junction to case ( $T_c = 25^\circ\text{C}$ )	$R_{th(j-c)}$	4.8	$^\circ\text{C/W}$
Thermal resistance, junction to ambient ( $T_a = 25^\circ\text{C}$ )	$R_{th(j-a)}$	62.5	$^\circ\text{C/W}$

## Marking



Note 1:  $I_{CP}$  maximum rating(200A) is limited by pulse width (3  $\mu\text{s}$ ).

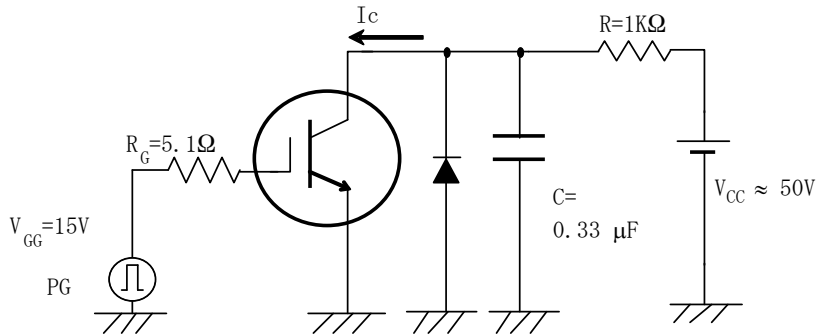
## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GES}$	$V_{GE} = \pm 30 \text{ V}, V_{CE} = 0 \text{ V}$	—	—	$\pm 100$	nA
Collector cut-off current		$I_{CES}$	$V_{CE} = 300 \text{ V}, V_{GE} = 0 \text{ V}$	—	—	0.5	mA
Emitter-collector voltage		$V_{ECS}$	$I_E = 0.5 \text{ A}, V_{GE} = 0 \text{ V}$ (Note2)	15	—	—	V
Gate-emitter cut-off voltage		$V_{GE} \text{ (OFF)}$	$I_C = 10 \text{ mA}, V_{CE} = 5 \text{ V}$	3.0	4.5	5.5	V
Collector-emitter saturation voltage		$V_{CE} \text{ (sat) (1)}$	$I_C = 45 \text{ A}, V_{GE} = 15 \text{ V}$	—	1.35	1.6	V
Collector-emitter saturation voltage		$V_{CE} \text{ (sat) (2)}$	$I_C = 120 \text{ A}, V_{GE} = 15 \text{ V}$	—	1.95	2.4	V
Collector-emitter saturation voltage		$V_{CE} \text{ (sat) (3)}$	$I_C = 200 \text{ A}, V_{GE} = 15 \text{ V}$	—	2.6	3.3	V
Input capacitance		$C_{ies}$	$V_{CE} = 10 \text{ V}, V_{GE} = 0 \text{ V}, f = 1 \text{ MHz}$	—	2700	—	pF
Reverse transfer capacitance		$C_{res}$		—	155	—	
Output capacitance		$C_{oes}$		—	225	—	
Switching time (Resistance load)	Rise time	$t_r \text{ (1)}$	<p>15 V</p> <p>0</p> <p>5.1 <math>\Omega</math></p> <p><math>I_C = 80 \text{ A}</math></p> <p>3 <math>\Omega</math></p> <p><math>\approx 250 \text{ V}</math></p> <p><math>V_{IN}: t_r \leq 100 \text{ ns}</math>  <math>t_f \leq 100 \text{ ns}</math>  Duty cycle <math>\leq 1\%</math></p>	—	180	—	ns
	Turn-on time	$t_{on(1)}$		—	230	—	
	Fall time	$t_f$		—	200	300	
	Turn-off time	$t_{off}$		—	290	—	
Switching time (Discharge mode)	Rise time	$t_r \text{ (2)}$	$V_{CC} \approx 50 \text{ V}, I_{CP} = 100 \text{ A}$ $V_{GG} = 15 \text{ V}/0 \text{ V}, R_G = 5.1 \Omega$ (Note 3)	—	125	—	ns
	Turn-on time	$t_{on(2)}$		—	150	—	
Total gate charge (gate-emitter plus gate-drain)		$Q_g$	$V_{CE} = 300 \text{ V}, V_{GE} = 15 \text{ V}, I_C = 120 \text{ A}$	—	110	—	nC

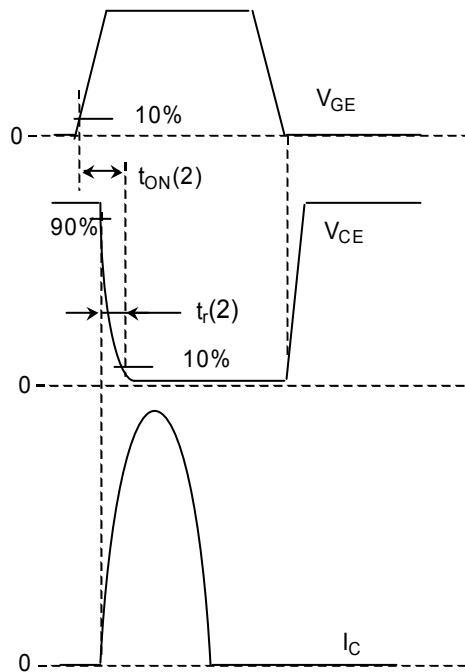
Note 2 : Pulse width  $\approx 80 \mu\text{s}$  (duty  $\approx 0.1\%$ ).

Note 3: Switching time measurement circuit and input/output waveforms.

< Switching circuit of discharge mode >



< Measurement waveforms >

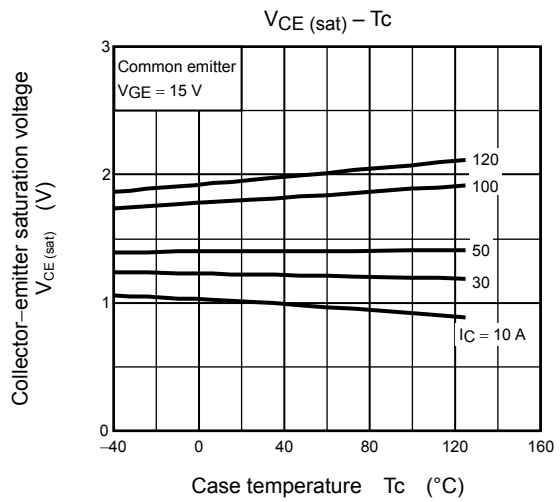
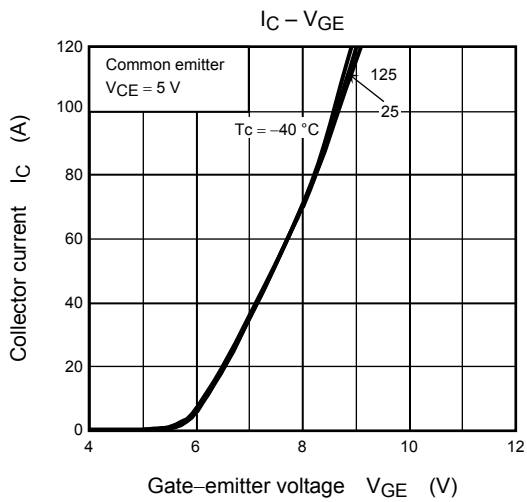
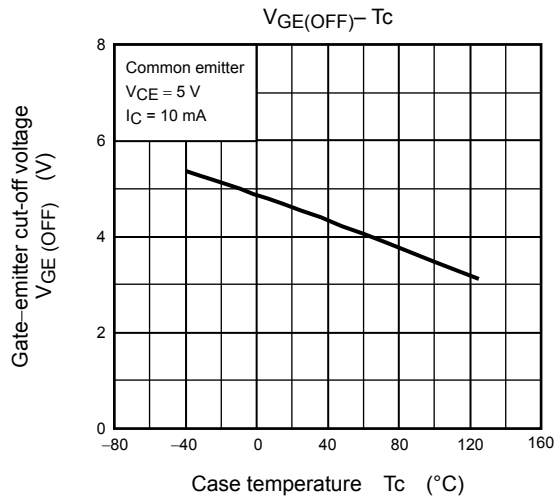
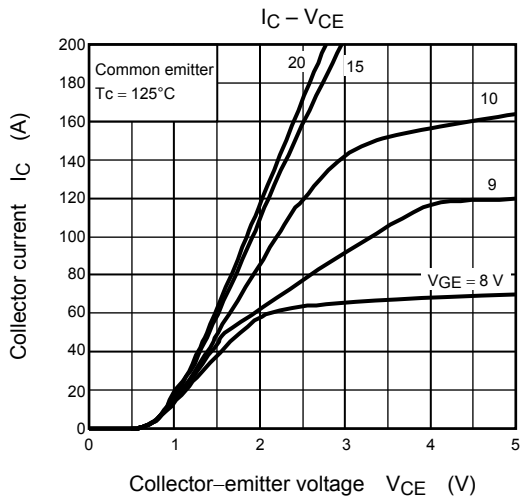
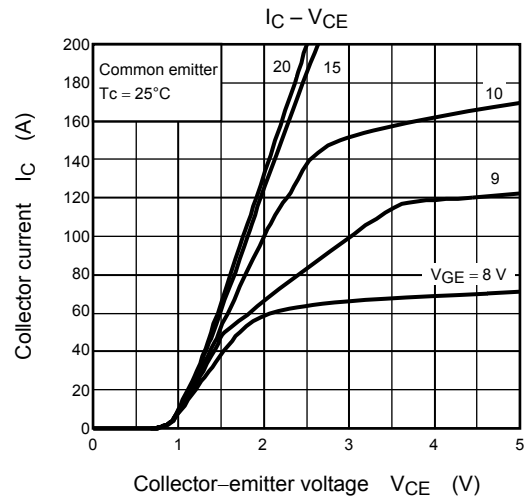
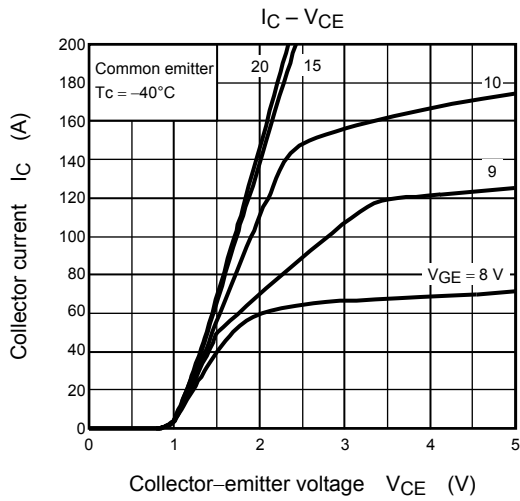


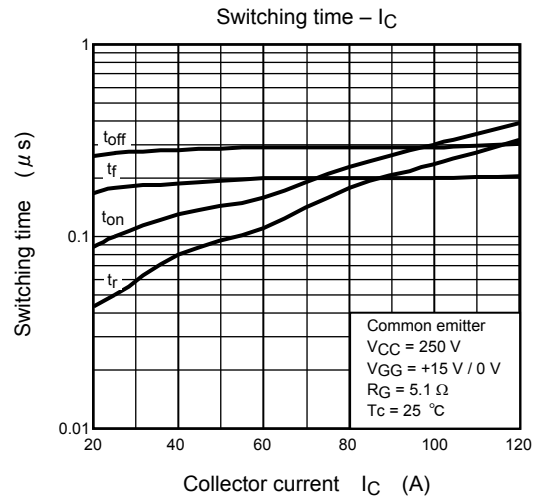
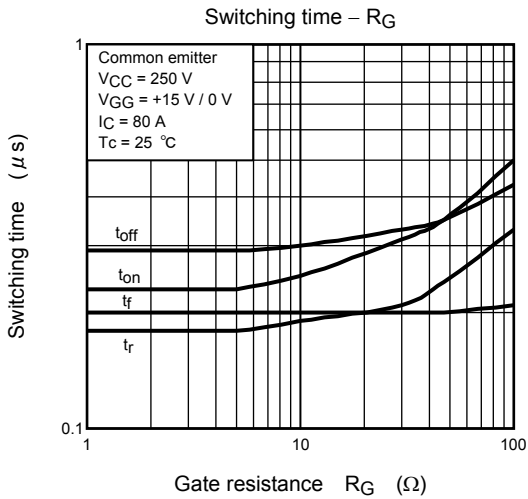
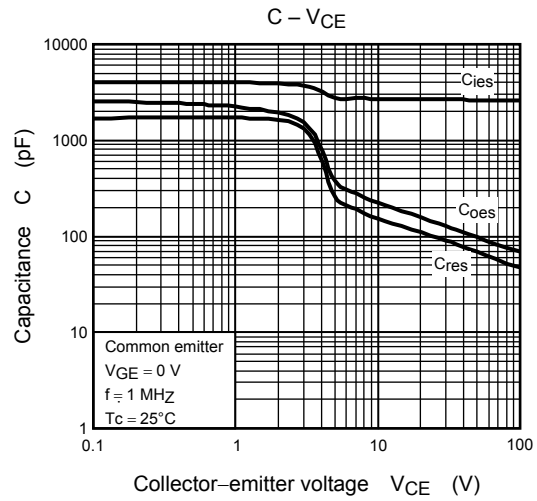
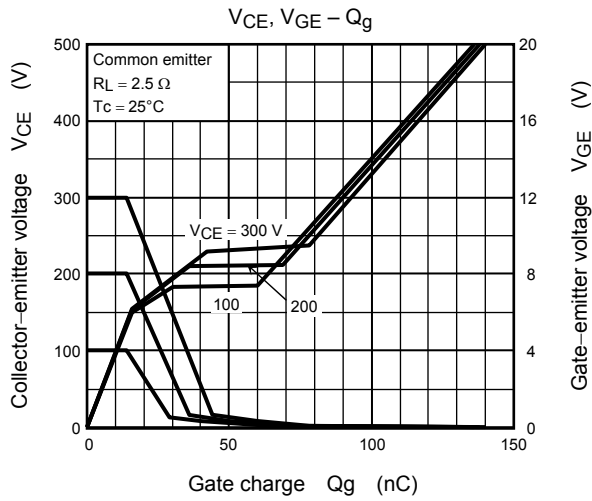
**Caution on handling**

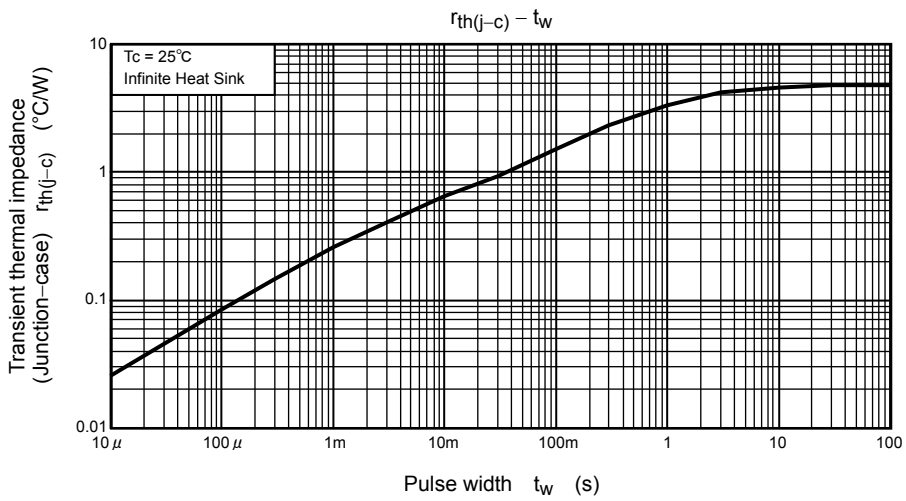
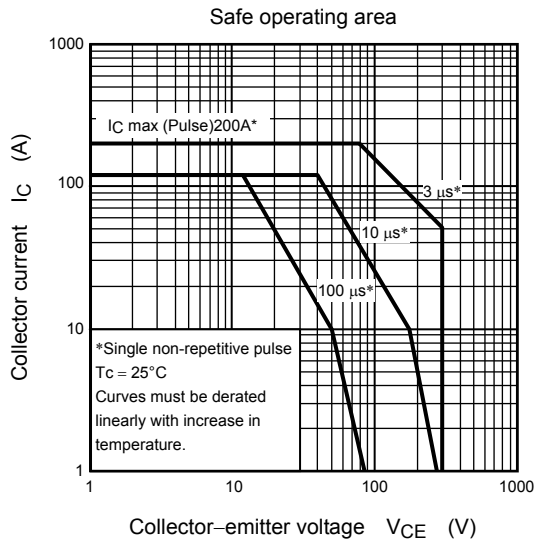
This MOS gate device is sensitive to electrostatic discharge (ESD).  
When handling the device, be sure that the environment is protected against static electricity.

**Caution in design**

This device is designed for use in PDP-TVs.  
Please contact our sales section if the device is intended for any other use.







**RESTRICTIONS ON PRODUCT USE**

20070701-EN GENERAL

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