

TOSHIBA Multi-Chip Device Silicon PNP Epitaxial Type, Schottky Barrier Diode

TPC6D03

High-Speed Switching Applications
DC-DC Converter Applications

- A PNP transistor and a Schottky barrier diode are mounted on a compact and slim package.

Maximum Ratings

Transistor (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	-20	V
Collector-emitter voltage		V_{CEO}	-20	V
Emitter-collector voltage		V_{ECO}	-9.5	V
Emitter-base voltage		V_{EBO}	-9.5	V
Collector current	DC	I_C	-1.2	A
	Pulse	I_{CP}	-2.0	A
Base current		I_B	-120	mA
Collector power dissipation (Q1 single-device operation)		P_C (Note 1)	400	mW
Junction temperature		T_j	150	°C

Diode (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Repetitive peak reverse voltage		V_{RRM}	30	V
Average forward current		$I_F (AV)$	0.7	A
Peak one cycle surge forward current (sine wave)		I_{FSM}	7.0	A
Power dissipation (D1 single-device operation)		P_D (Note 1)	320	mW
Junction temperature		T_j	125	°C

Maximum Ratings for Transistor and Diode (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Total power dissipation (simultaneous operation)		P_T (Note 2)	600	mW
Storage temperature range		T_{stg}	-55~150	°C

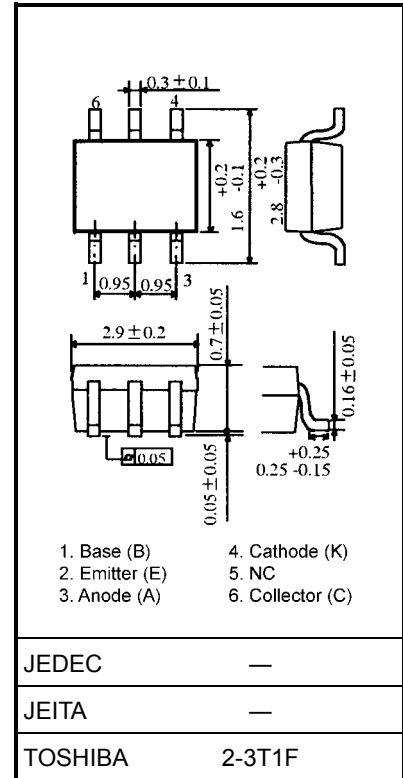
Thermal Resistance Characteristics (for transistor and diode)

Characteristics		Symbol	Max	Unit
Thermal resistance, junction to ambient (single-device operation)		$R_{th(j-a)}$ (Note 1)	312	°C/W

Note 1: Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm²)

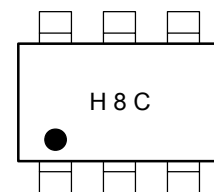
Note 2: Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm²)
Total power dissipation value when two devices are operated at the same time

Unit: mm

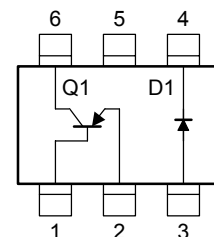


Weight: 0.011 g (typ.)

Marking



Circuit Configuration



Electrical Characteristics (Ta = 25°C)

Transistor

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	$V_{CB} = -20\text{ V}, I_E = 0$	—	—	-100	nA
Emitter cut-off current		I_{EBO}	$V_{EB} = -9.5\text{ V}, I_C = 0$	—	—	-100	nA
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	$I_C = -10\text{ mA}, I_B = 0$	-20	—	—	V
DC current gain		$h_{FE(1)}$	$V_{CE} = -2\text{ V}, I_C = -0.15\text{ A}$	140	—	350	
		$h_{FE(2)}$	$V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$	85	—	—	
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_C = -0.5\text{ A}, I_B = -16.7\text{ mA}$	—	—	-0.17	V
Base-emitter saturation voltage		$V_{BE(sat)}$	$I_C = -0.5\text{ A}, I_B = -16.7\text{ mA}$	—	—	-1.10	V
Switching time	Rise time	t_r	See Figure 1 circuit diagram.	—	40	—	ns
	Storage time	t_{stg}	$V_{CC} \approx -12\text{ V}, R_L = 24\ \Omega$	—	135	—	
	Fall time	t_f	$I_{B1} = -I_{B2} = -16.7\text{ mA}$	—	37	—	

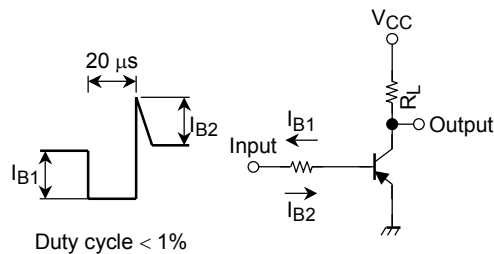


Figure 1 Switching Time Test Circuit & Timing Chart

Diode

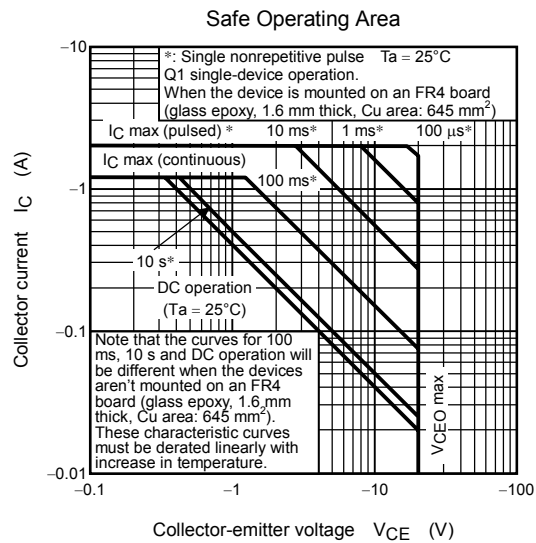
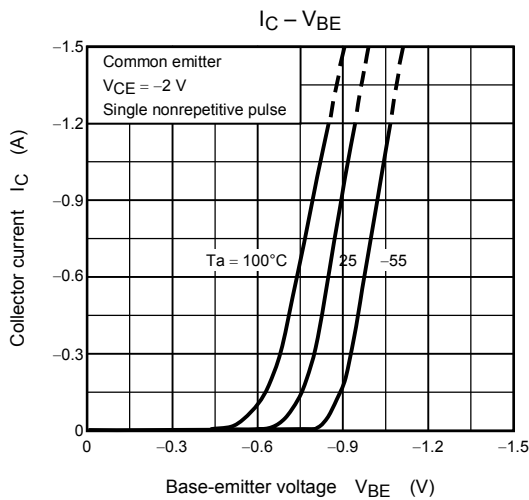
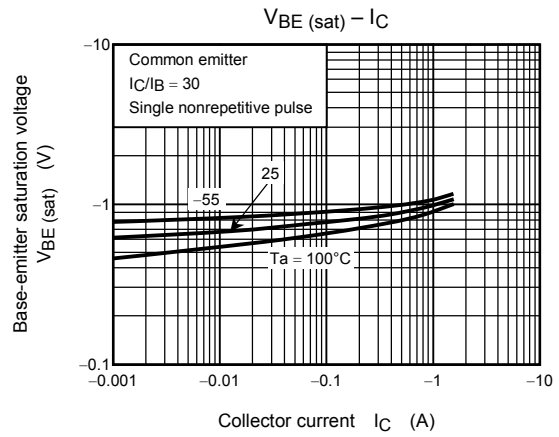
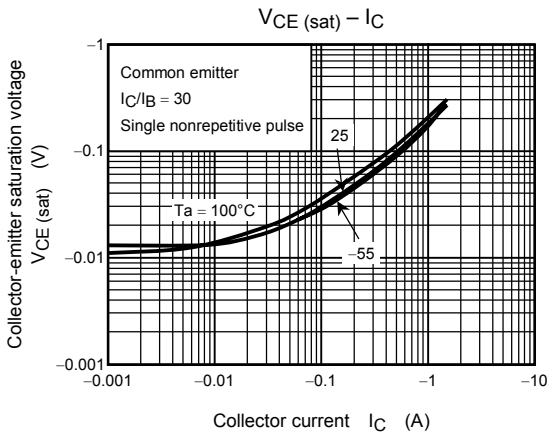
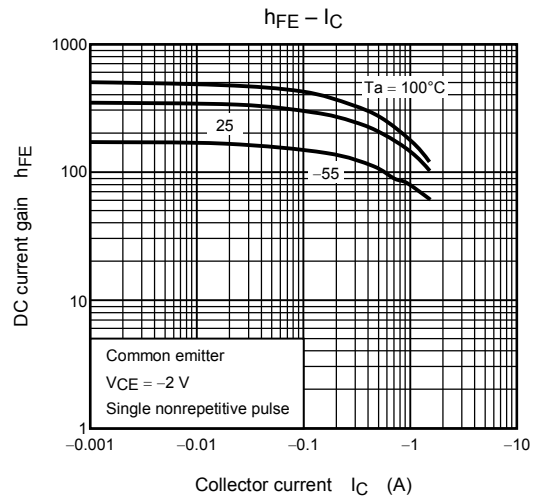
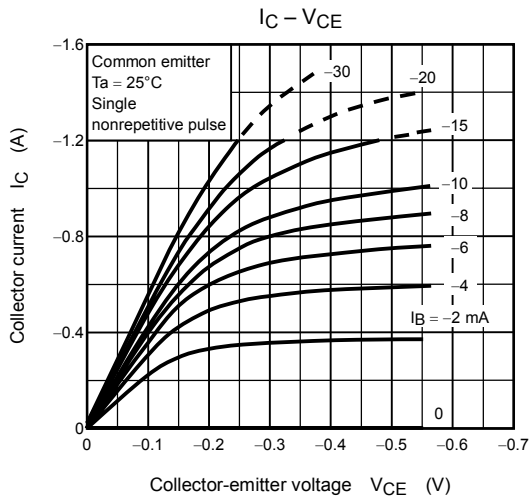
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Peak forward voltage		$V_{FM(1)}$	$I_F = 0.5\text{ A}$	—	0.35	0.4	V
Peak forward voltage		$V_{FM(2)}$	$I_F = 0.7\text{ A}$	—	0.38	0.43	V
Repetitive peak reverse voltage		V_{RRM}	$I_R = 3\text{ mA}$	30	40	—	V
Repetitive peak reverse current		I_{RRM}	$V_R = 10\text{ V}$	—	25	100	μA
Junction capacitance		C_j	$V_R = 10\text{ V}, f = 1\text{ MHz}$	—	19	—	pF

Handling Precaution

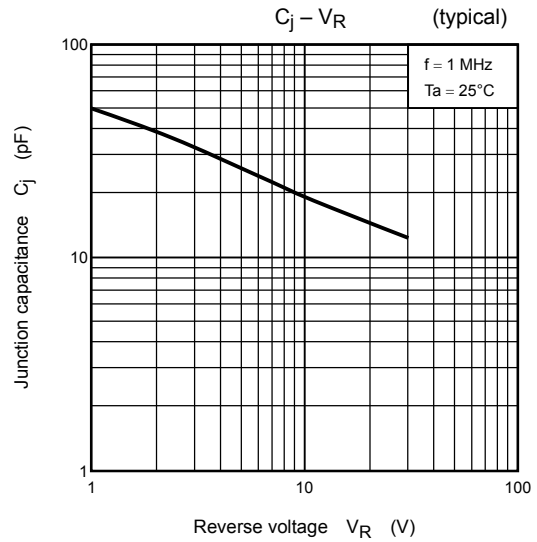
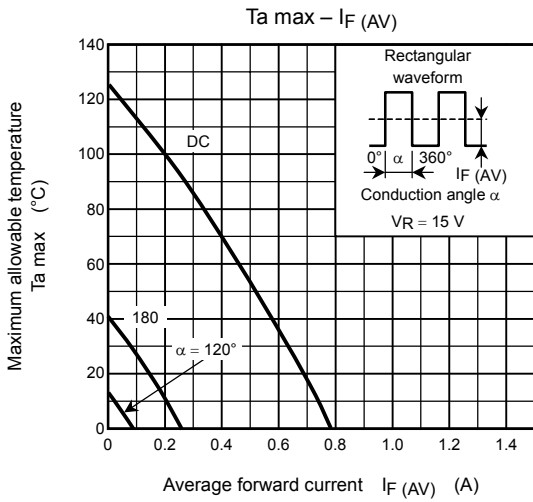
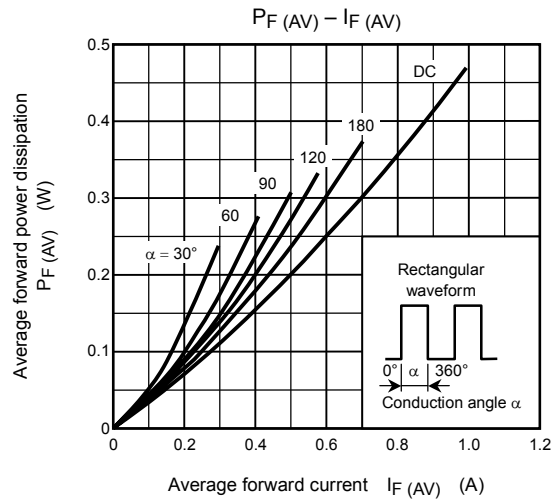
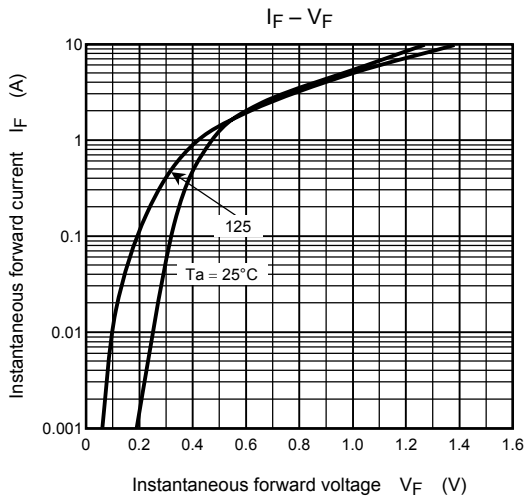
Schottky barrier diodes are having large reverse current leakage characteristic compare to other rectifier products. This current leakage and not proper operating temperature or voltage may cause thermal run.

Please take forward and reverse loss into consideration when you design.

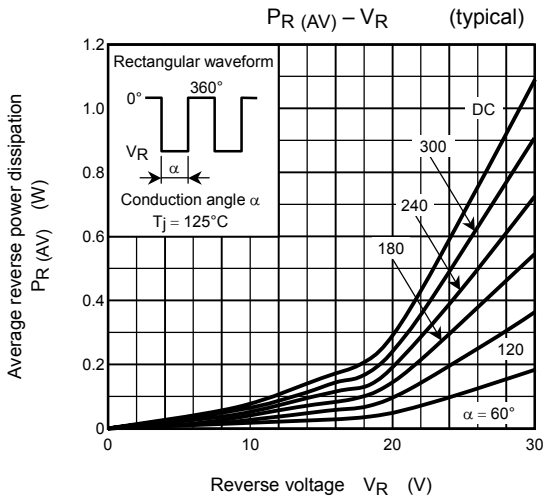
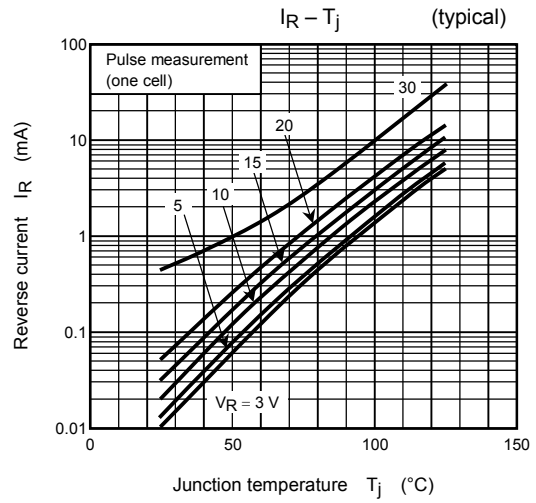
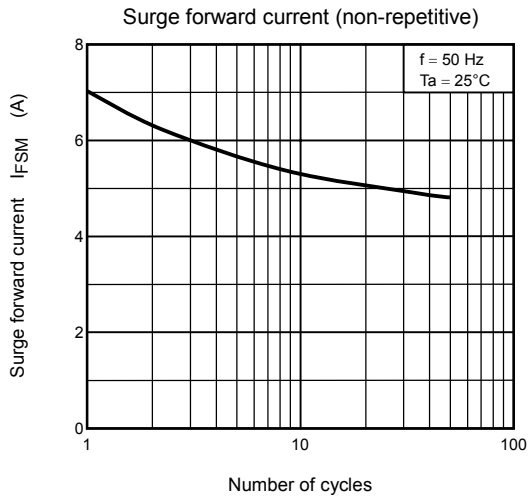
Transistor



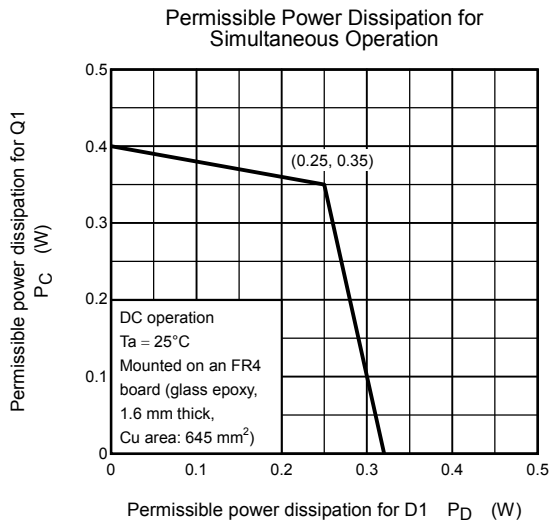
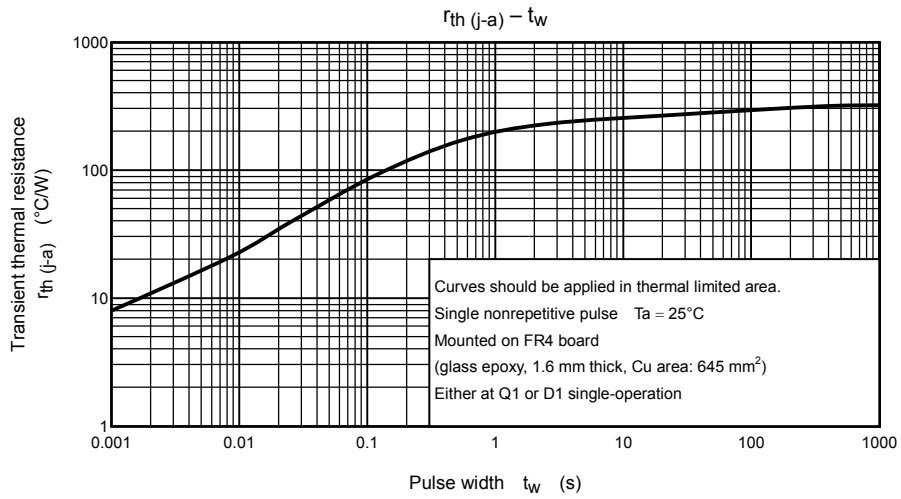
Diode



Diode



Transistor and Diode



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