

Press Pack IEGT Silicon N-Channel IEGT

ST3000GXH31A

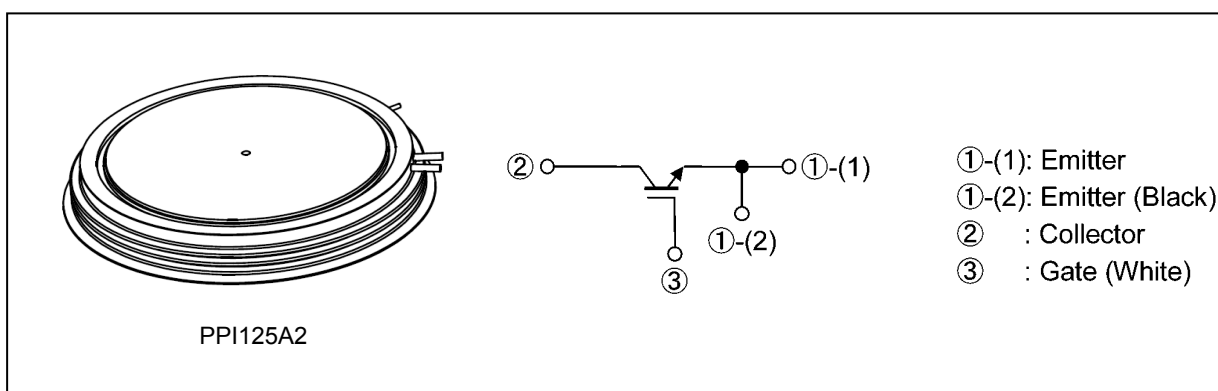
1. Applications

- Electric power transmission and distribution
- Motor Controllers
- High-Power Switching

2. Features

- (1) High reliability due to hermetic sealing structure.
- (2) Double side cooling type.

3. Packaging and Internal Circuit



Start of commercial production
 2019-03

4. Absolute Maximum Ratings (Note) ($T_c = 25\text{ }^\circ\text{C}$, unless otherwise specified)

Characteristics	Symbol	Note	Test Condition	Rating	Unit
Collector-emitter voltage	V_{CES}			4500	V
Gate-emitter voltage	V_{GES}			± 20	V
Collector current (DC)	I_C	(Note 1)		3000	A
Collector current (pulsed)	I_{CP}	(Note 2)		6000	A
Collector power dissipation	P_C	(Note 3)	$T_j = 25^\circ\text{C}$	25879	W
Junction temperature	T_j			-40 to 150	$^\circ\text{C}$
Operating junction temperature	$T_{j(\text{opr})}$			-40 to 125	$^\circ\text{C}$
Case Temperature	T_c			-40 to 85	$^\circ\text{C}$
Storage temperature	T_{stg}			-40 to 125	$^\circ\text{C}$
Mounting force	—			59 to 70	kN

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).

Note 1: $T_f = 78^\circ\text{C}$

Note 2: Pulse width and repetition rate should be such that junction temperature (T_j) does not exceed maximum T_j rating.

Note 3: refer to the application notes.

5. Thermal Characteristics (Note)

Characteristics	Symbol	Note	Test Condition	Max	Unit
Thermal resistance (junction-to-fin)	$R_{\text{th}(j-f)}$	(Note4)	Emitter side	12.5	K/kW
			Collector side	7.87	
			Double side	4.83	

Note4: Conductive thermal compound is added.

Note: Customers must also refer to and comply with the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the "TOSHIBA Semiconductor Reliability Handbook" and the instructions for the application with which the Product will be used with or for.

6. Electrical Characteristics

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate-emitter leakage current	I_{GES}	$V_{GE}=\pm 20V, V_{CE}=0V, T_j=25^\circ C$	—	—	± 100	nA
Collector-emitter cut-off current	I_{CES}	$V_{CE}=4500V, V_{GE}=0V, T_j=25^\circ C$	—	—	0.2	mA
Gate-emitter cut-off voltage	$V_{GE(off)}$	$I_C=3.0A, V_{CE}=5V, T_j=25^\circ C$	6.7	7.2	7.7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=3000A, V_{GE}=15V, T_j=25^\circ C$	—	2.1	—	V
		$I_C=3000A, V_{GE}=15V, T_j=150^\circ C$	—	2.6	3.2	
Input capacitance	C_{ies}	$V_{CE}=10V, V_{GE}=0V, f=100kHz, T_j=25^\circ C$	—	410	—	nF
Switching time (rise time)	t_r	$V_{CC}=2800V, I_C=3000A, V_{GE}=\pm 15V, R_{G(on)}=2.2\Omega, R_{G(off)}=39\Omega, T_j=150^\circ C$ (Inductive load, Di:3000GXHH28, $L_s=300nH$) See Fig. 6.1 and Fig. 6.2	—	0.43	—	μs
Switching time (turn-on delay time)	$t_{d(on)}$		—	0.42	—	μs
Switching time (turn-on time)	t_{on}		—	0.85	—	μs
Switching time (fall time)	t_f		—	2.5	—	μs
Switching time (turn-off delay time)	$t_{d(off)}$		—	12.5	—	μs
Switching time (turn-off time)	t_{off}		—	15	—	μs
Turn-on switching loss	E_{on}		—	12	—	J
Turn-off switching loss	E_{off}		—	20	—	J
Short-circuit pulse width	t_{psc}		$V_{CC}=3200V, V_{GE}=\pm 15V, R_{G(on)}=2.2\Omega, R_{G(off)}=39\Omega, L_s=200nH, T_j=150^\circ C$	—	—	10

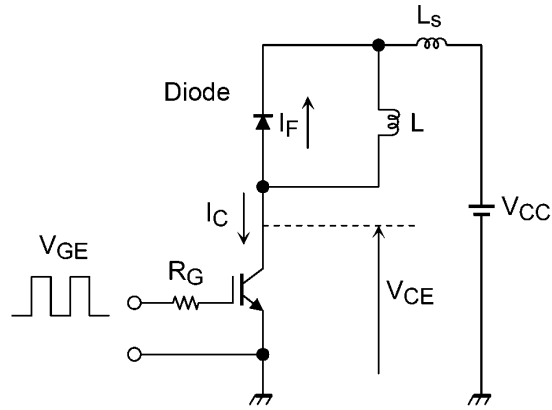


Fig. 6.1 Test Circuit

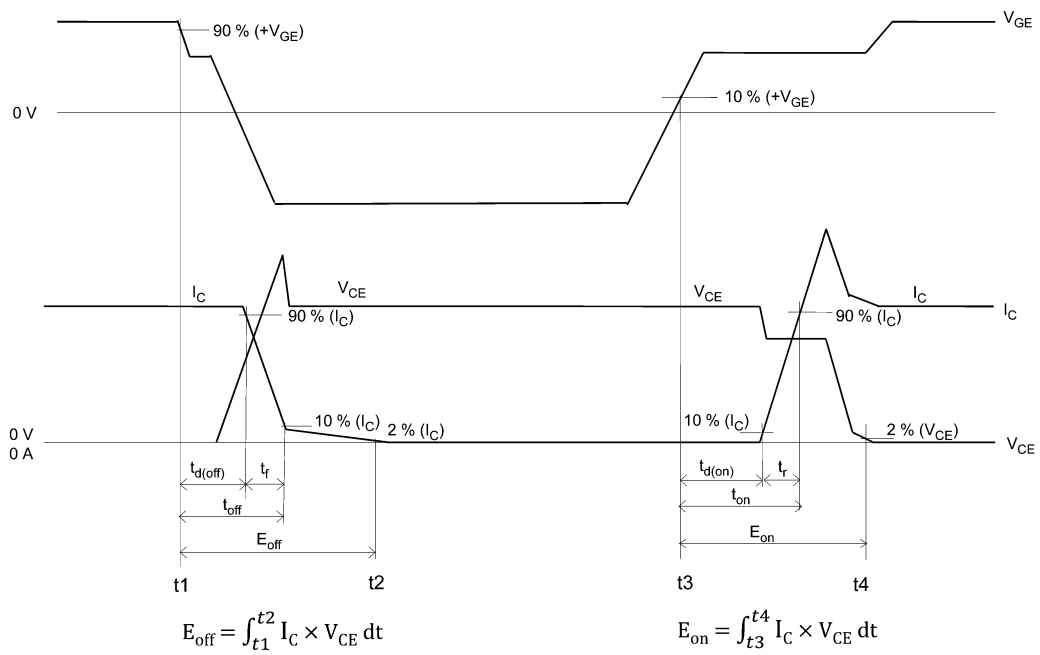


Fig. 6.2 Timing Chart

7. Characteristics Curves (Note)

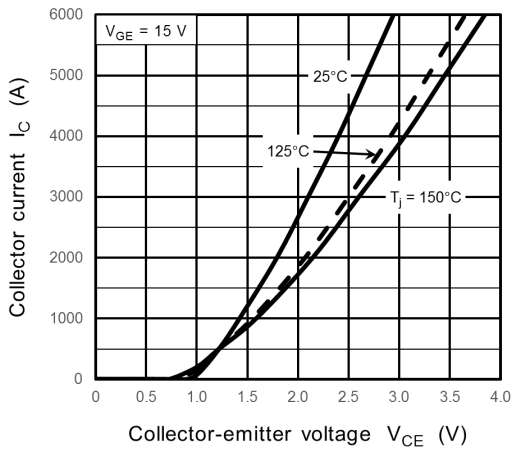


Fig. 7.1 $I_C - V_{CE}$

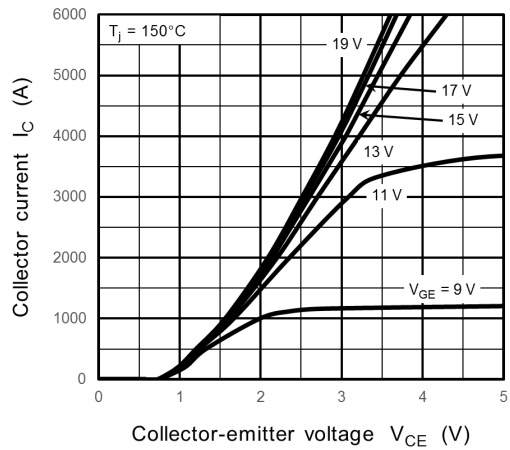


Fig. 7.2 $I_C - V_{CE}$

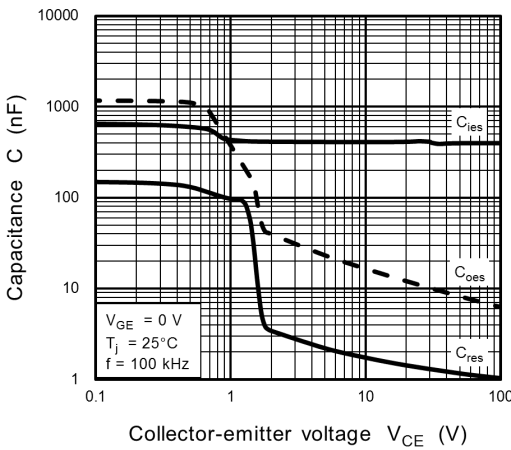


Fig. 7.3 Capacitance - V_{CE}

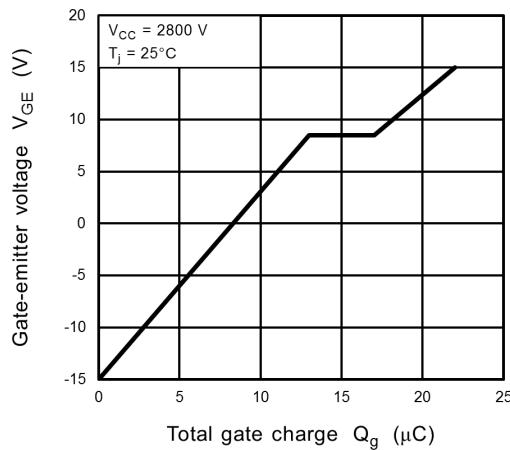


Fig. 7.4 $V_{GE} - Q_g$

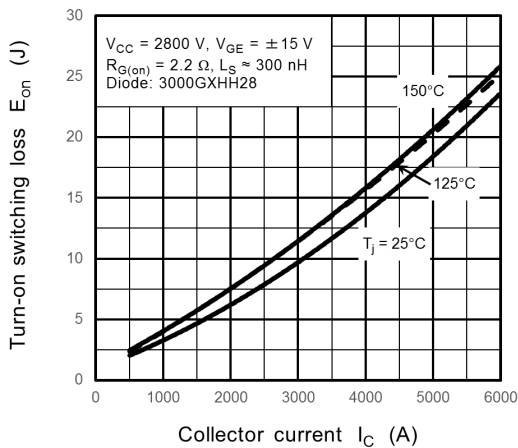


Fig. 7.5 $E_{on} - I_C$

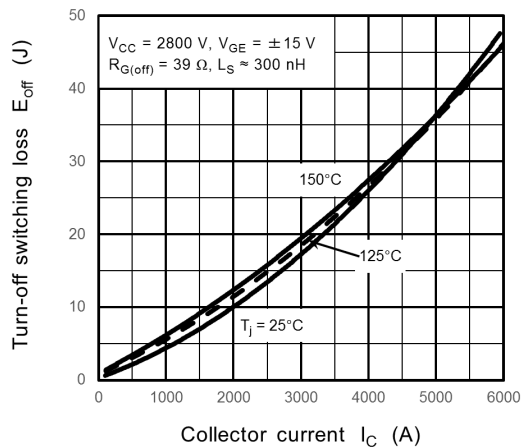


Fig. 7.6 $E_{off} - I_C$

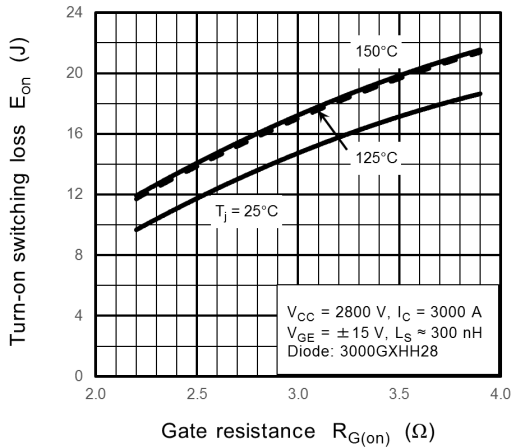


Fig. 7.7 $E_{on} - R_{G(on)}$

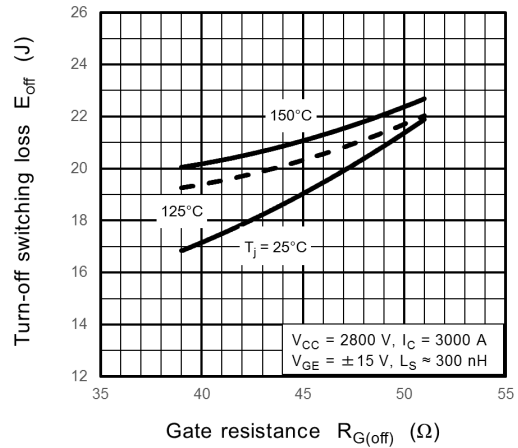


Fig. 7.8 $E_{off} - R_{G(off)}$

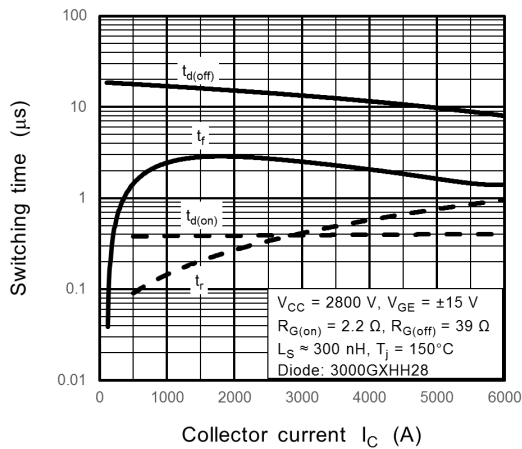


Fig. 7.9 Switching time - I_C

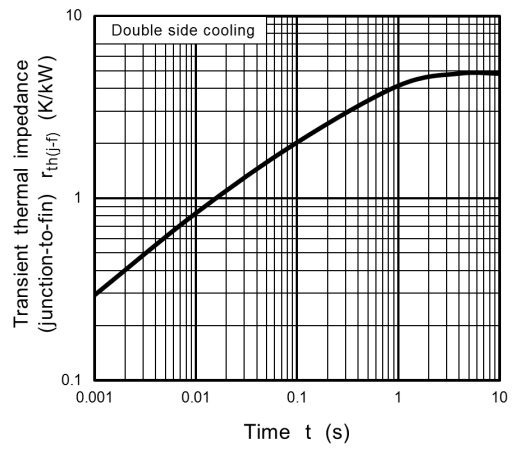


Fig. 7.10 $r_{th(j-f)} - t$ (Guaranteed value)

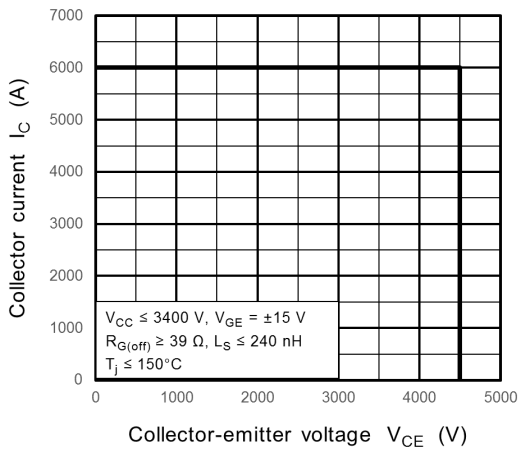
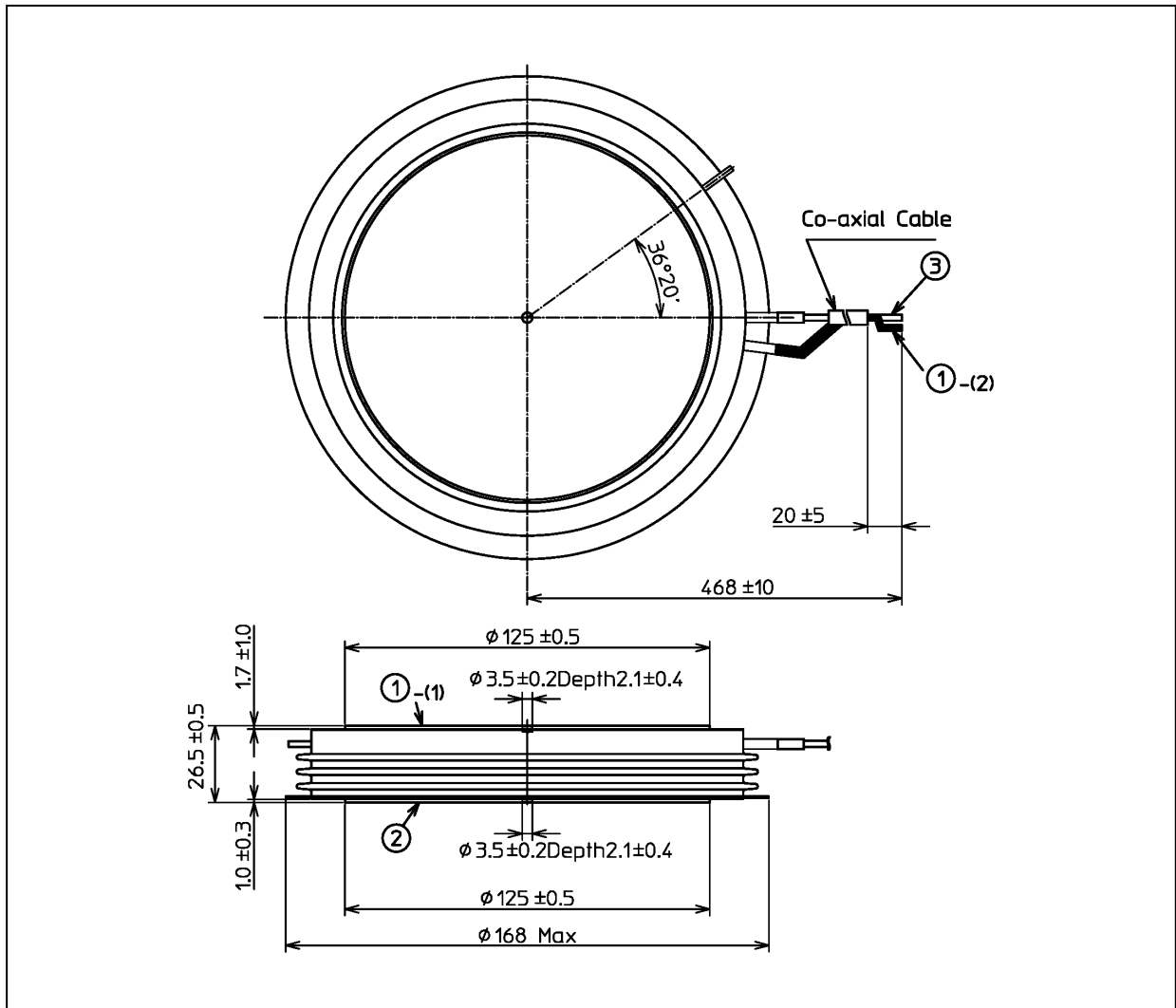


Fig. 7.11 RBSOA (Guaranteed value)

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 2700 g (typ.)

Package Name(s)
TOSHIBA: 2-168A2S
Nickname: PPI125A2

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