



## General Description

This product family offers state of the art performance. It is designed for high frequency applications where high efficiency and high reliability are required.

## Features

- Low conduction loss due to low  $V_F$
- Extremely low switching loss by tiny  $Q_c$
- Highly rugged due to better surge current
- Industrial standard quality and reliability

## Applications

- UPS
- Power Inverter
- High performance SMPS
- Power factor correction



TO-247-2L  
Package



Ordering Part Number	Package	Marking
HC3D50170H	TO-247-2L	HC3D50170H



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

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		$V_{RM}$	1700	V
Reverse voltage (DC)		$V_R$	1700	V
Continuous forward current ( $T_c=145^\circ\text{C}$ )		$I_F$	50 <sup>*1</sup>	A
Surge non-repetitive forward current	PW=10ms sinusoidal, $T_j=25^\circ\text{C}$	$I_{FSM}$ <sup>*2</sup>	150	A
	PW=10ms sinusoidal, $T_j=150^\circ\text{C}$		110	A
	PW=10μs square, $T_j=25^\circ\text{C}$		630	A
$i^2t$ value	$1 \leq PW \leq 10\text{ms}$ , $T_j=25^\circ\text{C}$	$\int i^2 dt$ <sup>*2</sup>	120	$\text{A}^2\text{s}$
	$1 \leq PW \leq 10\text{ms}$ , $T_j=150^\circ\text{C}$		60	$\text{A}^2\text{s}$
Junction temperature		$T_j$	175	$^\circ\text{C}$
Range of storage temperature		$T_{stg}$	-55 to +175	$^\circ\text{C}$

\*1 Limited by  $T_j$  \*2 Assumes  $Z_{th(j-a)}$  of 0.16  $^\circ\text{C}/\text{W}$  or less. (Pulse Width = 8.3ms)



Electrical characteristics (T<sub>j</sub> = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V <sub>DC</sub>	I <sub>R</sub> =0.3mA	1700	-	-	V
Forward voltage	V <sub>F</sub>	I <sub>F</sub> =50A, T <sub>j</sub> =25°C	-	1.65	1.95	V
		I <sub>F</sub> =50A, T <sub>j</sub> =150°C	-	2.5	-	V
		I <sub>F</sub> =50A, T <sub>j</sub> =175°C	-	2.8	-	V
Reverse current	I <sub>R</sub>	V <sub>R</sub> =1700V, T <sub>j</sub> =25°C	-	5	300	μA
		V <sub>R</sub> =1700V, T <sub>j</sub> =150°C	-	110	-	μA
		V <sub>R</sub> =1700V, T <sub>j</sub> =175°C	-	250	-	μA
Total capacitance	C	V <sub>R</sub> =1V, f=1MHz	-	3100	-	pF
		V <sub>R</sub> =1700V, f=1MHz	-	170	-	pF
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> =800V, di/dt=500A/μs	-	158	-	nC
Switching time	t <sub>C</sub>	V <sub>R</sub> =800V, di/dt=500A/μs	-	39	-	ns

Electrical characteristic curves

Fig.1 V<sub>F</sub> - I<sub>F</sub> Characteristics

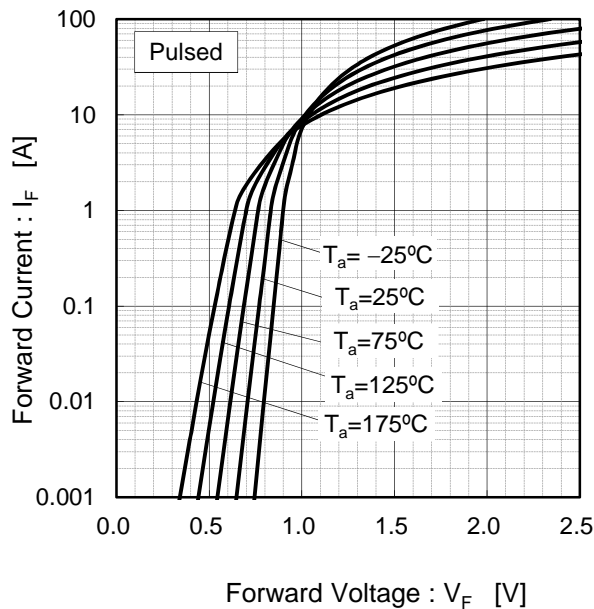


Fig.2 V<sub>F</sub> - I<sub>F</sub> Characteristics

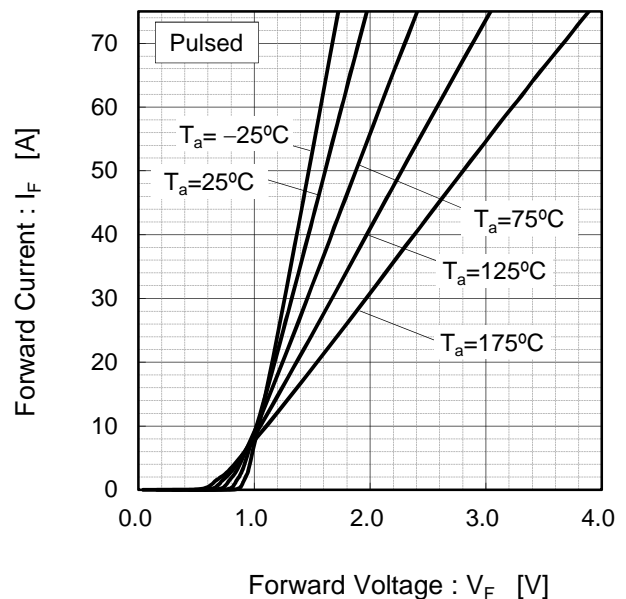




Fig.3  $V_R - I_R$  Characteristics

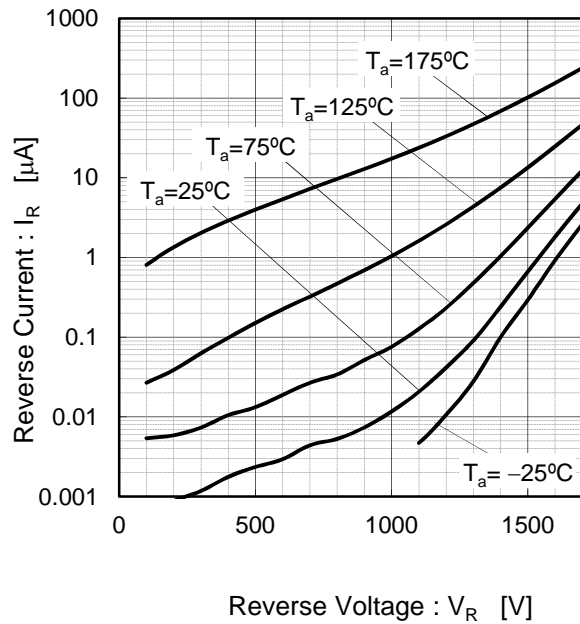


Fig.4  $V_R - C_t$  Characteristics

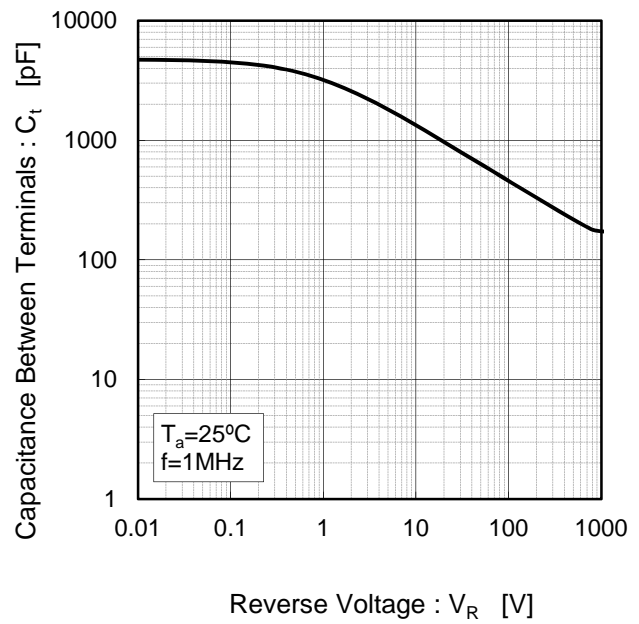


Fig.5 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)\*

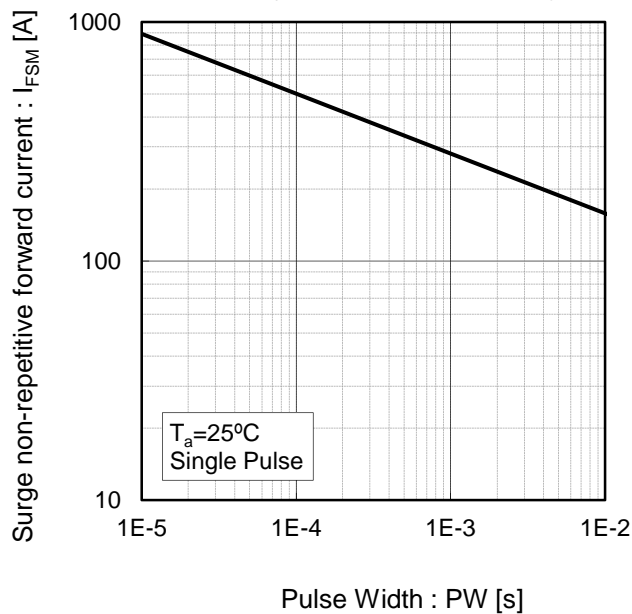
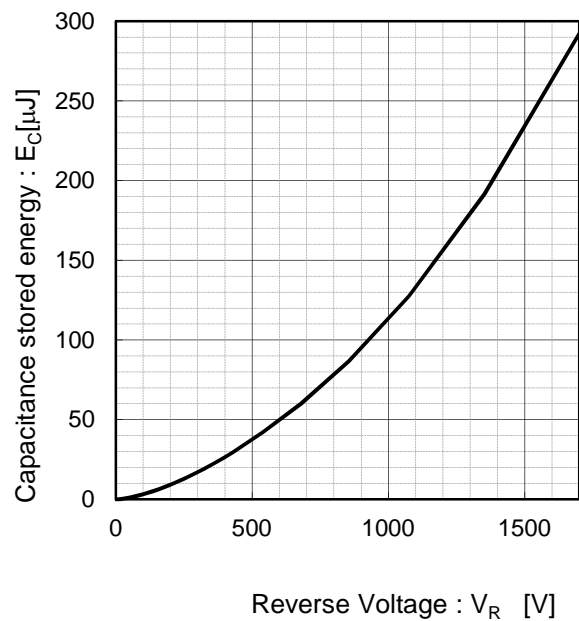


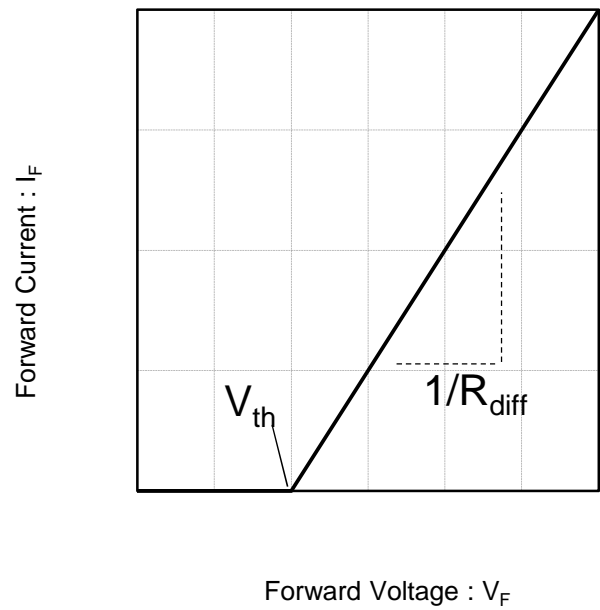
Fig.6 Typical capacitance store energy



\* Assumes  $Z_{th(j-a)}$  of  $0.38^\circ C/W$  or less.  
(Pulse Width = 8.3ms)



Fig.7 Equivalent forward current curve



$$V_F = V_{th} + R_{diff} I_F$$

$$V_{th}(T_j) = a_0 + a_1 T_j$$
$$R_{diff}(T_j) = b_0 + b_1 T_j + b_2 T_j^2$$

Symbol	Typical Value	Unit
$a_0$	9.21E-01	V
$a_1$	- 1.52E-03	V/°C
$b_0$	1.20E-02	$\Omega$
$b_1$	8.13E-05	$\Omega/^{\circ}\text{C}$
$b_2$	5.64E-07	$\Omega/^{\circ}\text{C}^2$

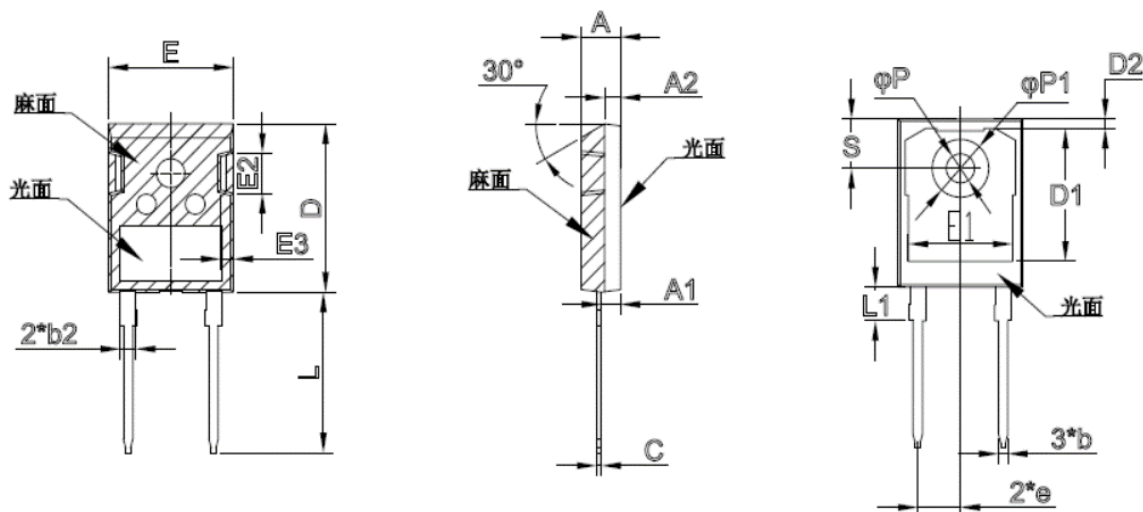
$$T_j \text{ in } ^{\circ}\text{C}; -55\text{ }^{\circ}\text{C} < T_j < ^{\circ}\text{C} ; I_F < 100\text{A}$$



## Package Dimensions

Package TO-247-2L

Unit:mm



	Min	Nom	Max		Min	Nom	Max
A	4.70	5.00	5.20	E1	13.06	13.26	13.56
A1	2.30		2.50	E2	4.90	5.00	5.10
A2	1.90	2.00	2.10	E3	1.50	1.60	1.70
b	1.10	1.20	1.30	e	5.34	5.44	5.54
b2		2.00		L	19.80	20.00	20.32
				L1		4.17	4.50
C	0.5	0.6	0.7	P	3.50	3.60	3.70
D	20.8	20.95	21.1	P1	7.00	7.19	7.40
D1		16.55		S	6.04	6.15	6.3
D2	0.95	1.17	1.35				
E	15.48	15.88	16.28				



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