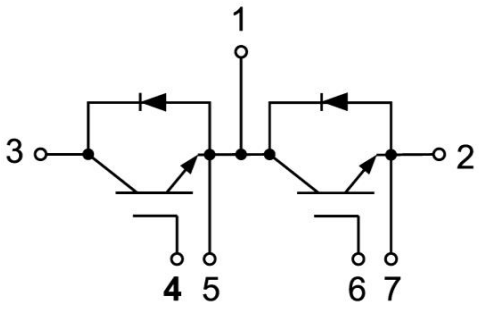
GF50HF120T1VH

IGBT Module

Features：

- NPT Technology
- Short Circuit Rated >10μs
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested(2×Ic)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications：

- UPS
- Welding Machine、Cutting Machine
- Induction Heating、Plating Power Supply

IGBT, Inverter

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=80℃	50	A
		T_C=25℃	90	A
I_{CM}	Repetitive Pulse Collector Current	T_J=150℃	100	A
t_{sc}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per leg	T_C=25℃ T_{Jmax}=150℃	480	W

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1mA, V_{CE}=V_{GE}		5.0	5.5	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=50A, V_{GE}=15V	T_J=25℃		2.70		V
			T_J=125℃		3.40		V
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=±20V, V_{CE}=0V, T_J=25℃				200	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=1MHz			3.7		nF
C_{oes}	Output Capacitance				0.36		nF
C_{res}	Reverse Transfer Capacitance				0.14		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V, I_C=50A, R_{Gon}=15Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		247		ns
			T_J=125℃		249		
t_r	Rise Time		T_J=25℃		59		ns
			T_J=125℃		57		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V, I_C=50A, R_{Goff}=15Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		273		ns
			T_J=125℃		284		
t_f	Fall Time		T_J=25℃		139		ns
			T_J=125℃		172		
E_{on}	Turn-on Switching Loss	V_{CC}=600V, I_C =50A, R_G =15Ω, V_{GE}=±15V, di/dt=770A/μs(T_J=125℃) Inductive Load	T_J=25℃		3.3		mJ
			T_J=125℃		4.2		
E_{off}	Turn-off Switching Loss	V_{CC}=600V, I_C=50A, R_G=15Ω, V_{GE}=±15V, du/dt=5600V/μs(T_J=125℃) Inductive Load	T_J=25℃		1.6		mJ
			T_J=125℃		2.4		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		507		nC
RBSOA	Reverse Bias Safe Operation Area	I_C=100A, V_{CC}=1050V, Vp=1200V, Rg=15Ω, V_{GE}=+15V to 0V, T_J=150°C		Trapezoid			
SCSOA	Short Circuit Safe Operation Area	V_{CC}=600V, V_{GE}=15V, T_J=150℃		10			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-to-Case					0.26	℃/W

Diode, Inverter

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current	100	A

Electrical Characteristics of Diode (T_C=25℃ unless otherwise specified)

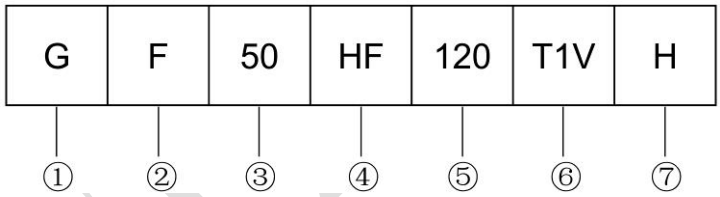
Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F=50A, V_{GE}=15V	T_J=25℃		2.55		V
			T_J=125℃		2.75		
t_{rr}	Reverse Recovery Time	I_F=50A, di/dt=1190A/μs, V_{rr} 600V, V_{GE}=-15V	T_J=25℃		166		ns
			T_J=125℃		300		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		29		A
			T_J=125℃		37		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		2.5		μC
			T_J=125℃		4.5		
E_{rec}	Reverse Recovery Energy		T_J=25℃		0.9		mJ
			T_J=125℃		1.8		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-to-Case					0.70	℃/W

Module

Symbol	Description		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	f=50Hz, 1minute	2500			V
T_J	Maximum Junction Temperature				150	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T_{stg}	Storage Temperature		-40		+125	℃
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-to-Sink Thermally (Conductive Grease Applied)				0.07	℃/W
T	Power Terminals Screw:M5		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			165		g

Ordering Information Table

Device code



① - IGBT Module
② - NPT, Fast IGBT
③ - Rated Current (50=50A)
④ - Circuit Configuration (Half Bridge)
⑤ - Rated Voltage (120=1200V)
⑥ - Package Type
⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)

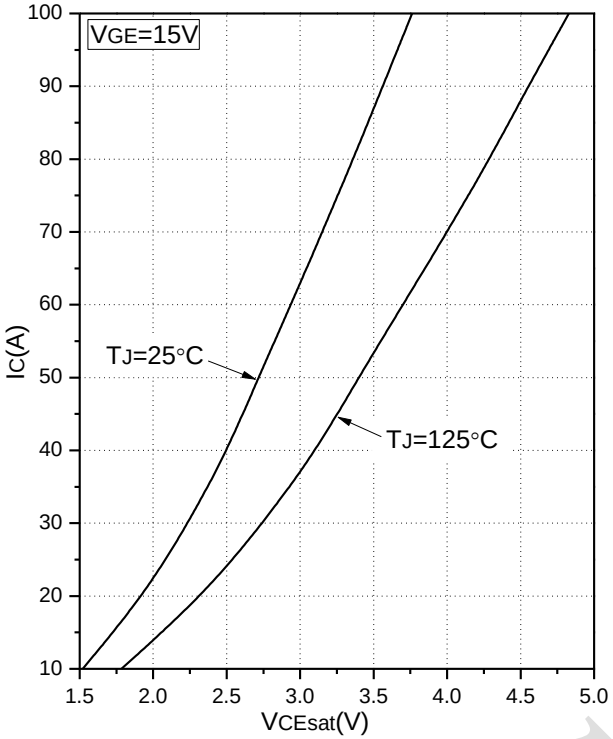


Fig.1 Typical Saturation Voltage Characteristics

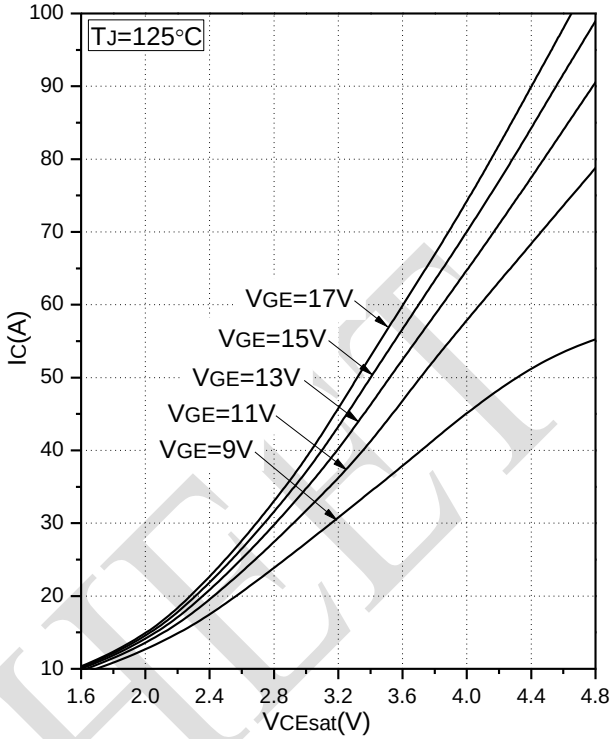


Fig.2 Typical Output Characteristics

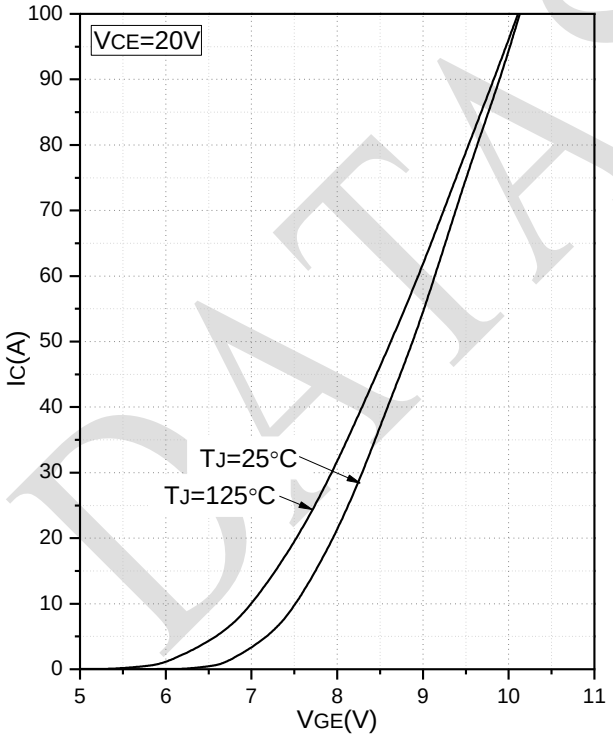


Fig.3 Transfer Characteristic

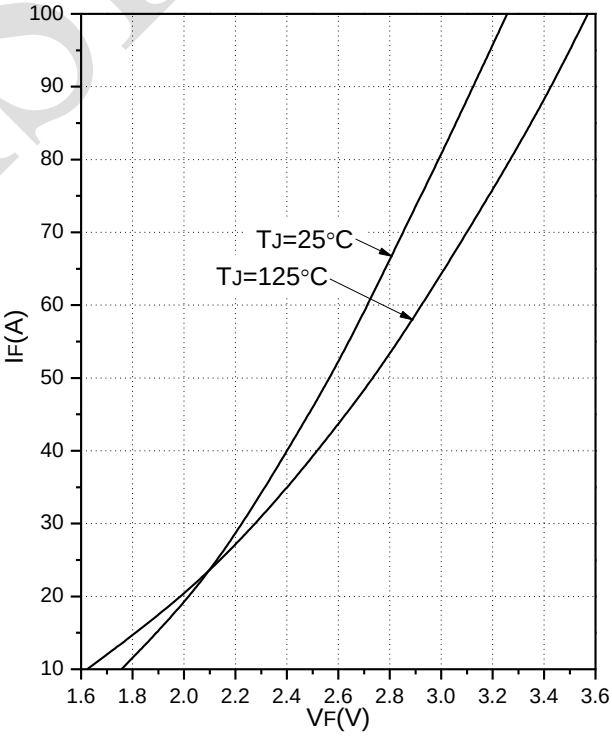


Fig.4 Forward Characteristics of Diode

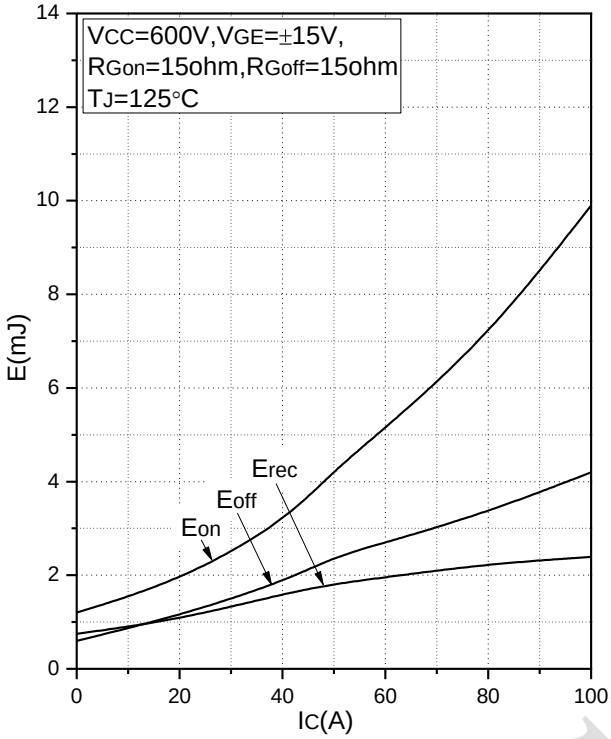


Fig.5 Typical Switching Loss vs. Collector Current

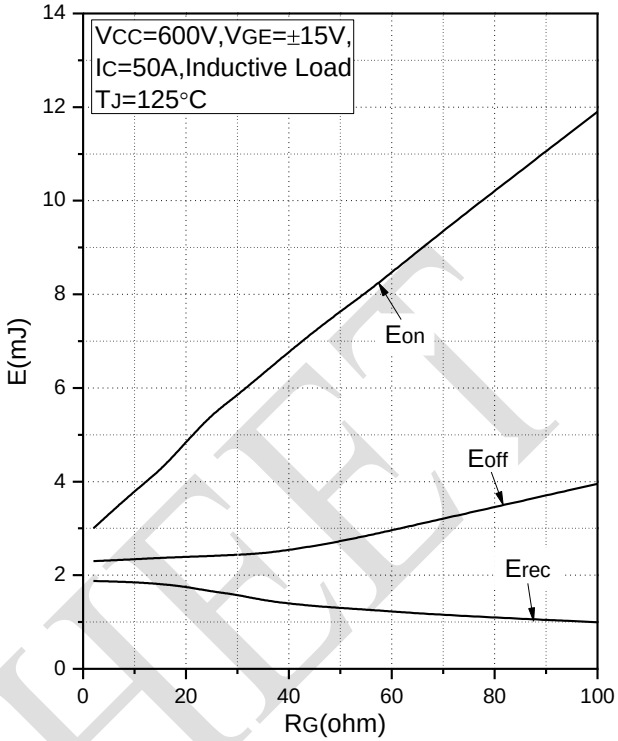


Fig.6 Typical Switching Loss vs. Gate Resistance

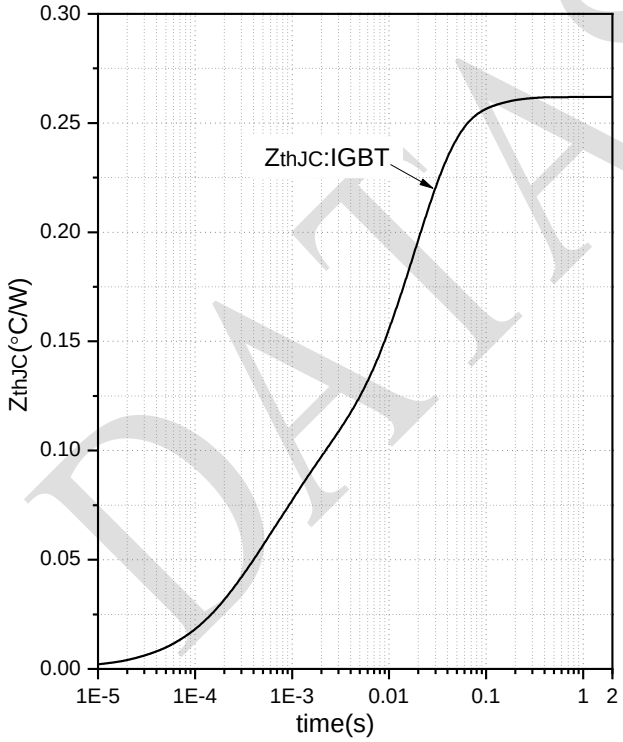


Fig.7 Transient Thermal Impedance (IGBT)

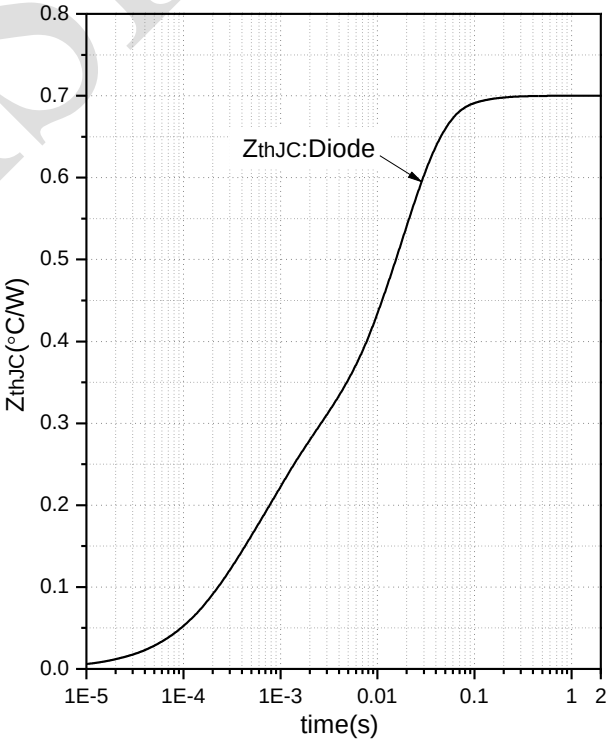


Fig.8 Transient Thermal Impedance (Diode)

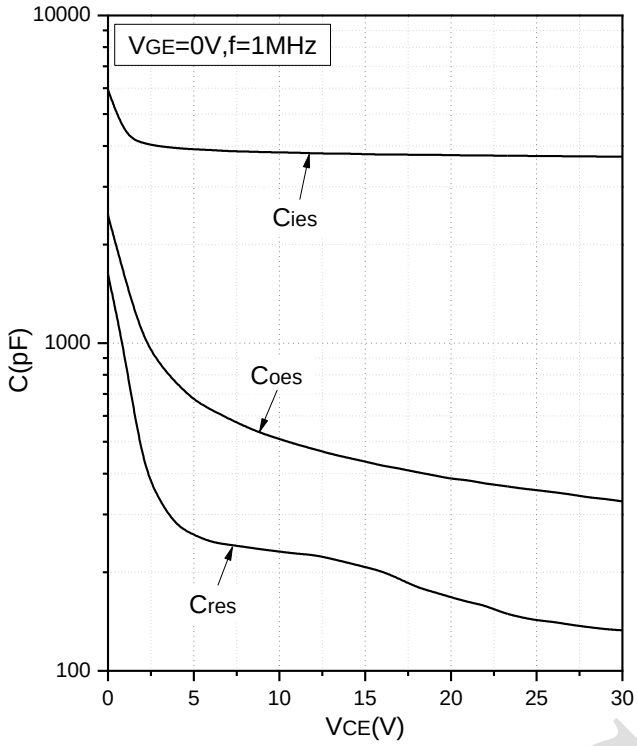


Fig.9 Capacitance Characteristics

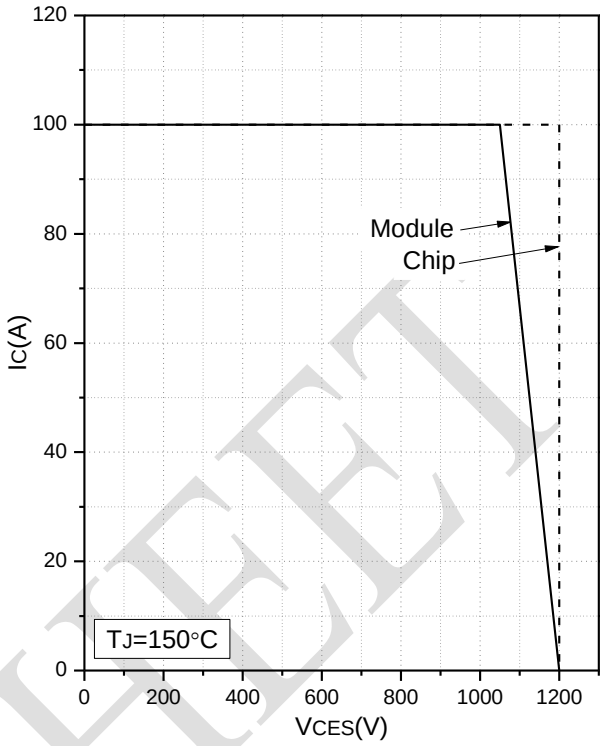
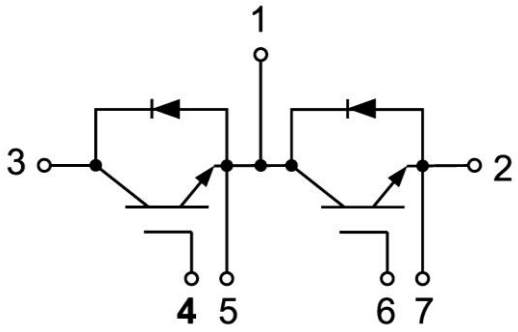
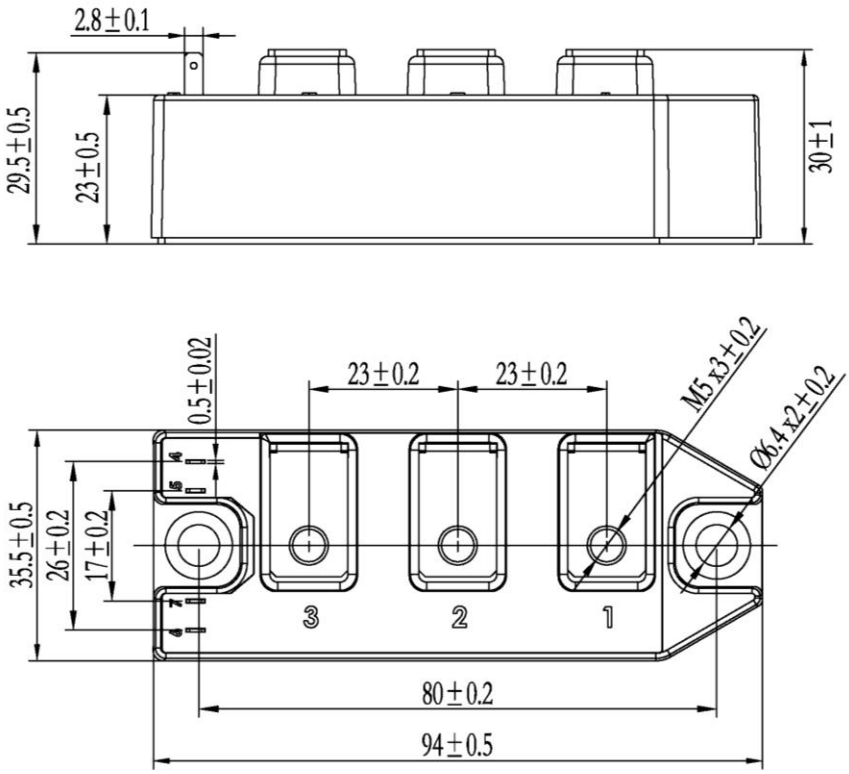


Fig.10 Reverse Bias Safe Operation Area (RBSOA)

Internal Circuit



Package Outline (Unit: mm):



Date	Revision	Notes
3/17/2021	A	Final Version

Announcement

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The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

The released datasheet would be issued with “REV.” + “alphabet characters”.