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Insulated Gate Bipolar Transistor

CRG40T60AN3HD, CRG40T60AK3HD

Overview

CRG40T60AN3HD and CRG40T60AK3HD adopt advanced groove

FS IGBT technology has good conduction and switching characteristics and is easy to use in parallel.

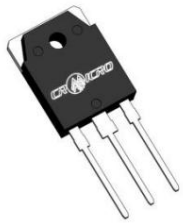
Complies with RoHS directive requirements.

Characteristic Parameters		
VCES	**600**	**IN**
IC	**40**	**A**
Ptot ÿTC=25ÿÿ	**336 W**	
VCE(sat)	**1.9**	**IN**

Features

- Trench FS technology, positive temperature coefficient;
- Low on-state voltage drop: VCE(sat) , TYP=1.9V @IC=40A, VGE=15V ;

Package: TO-3P (N)



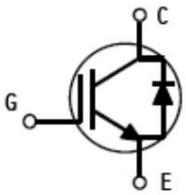
use

- Inverter welding machine
- Medium and high switching frequency inverter
- UPS

Package: TO-247



Internal equivalent schematic



Packaging information

product name	Package	Print Stamp	package style
CRG40T60AN3HD	TO-3PN	G40T60AN3HD	Strips
CRG40T60AK3HD	TO-247	G40T60AK3HD	Strips

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Limiting values (unless otherwise specified, TJ = 25°C)

Symbolic parameter name		Rating	unit
VCES maximum collector-emitter DC voltage		600	IN
VGES Maximum gate-emitter DC voltage Collector DC		±20	IN
IC	current @TC=25ÿ	80	A
	Collector DC current @TC=100ÿ	40	
ICM a1	Collector pulse current @TC=25ÿ	120	A
IF	Diode DC forward current @TC=100ÿ Diode DC forward	40	A
	current @TC=25ÿ	80	A
IFM diode pulse forward current		120	A
PD	Power dissipation @TC=25ÿ	336	IN
	Power dissipation @TC=100ÿ	168	
TJ Maximum Junction Temperature		175	ÿ
Tstg storage temperature range		-55ÿ150	ÿ
TL lead maximum soldering temperature Note: a1:		270	ÿ

Pulse width is limited by the maximum junction temperature

Thermal

property symbol parameter name	typical	maximum	unit
RÿJC Junction to case thermal resistance (IGBT)	-	0.446	ÿ/W
RÿJC Junction to case thermal resistance (diode)	-	0.68	ÿ/W
RÿJA Thermal resistance from junction to ambient	-	40	ÿ/W

Electrical Characteristics (Unless otherwise specified, TJ = 25°C)

symbol	parameter name	Test Conditions	Standard value			unit
			Minimum	Typical	Maximum	
Static characteristics (off state)						
V(BR)CES collector-emitter breakdown voltage VGE=0V, ICE=250uA			600	-	-	IN
ICES collector leakage current under zero gate voltage VGE=0V, VCE=600V			-	-	2.0 mA	
IGES(F) forward gate-body leakage current		VGE=+20V	-	-	+250 nA	
IGES(R) Reverse Gate-Body Leakage Current		VGE = -20V	-	-	-250 nA	
Static Characteristics (On State)						
VCE(sat) collector-emitter saturation voltage drop IC=40A		VGE=15V	-	1.9	2.4 V	
VGE(th) threshold voltage		IC=1mA , VCE=VGEPulse	3.5	4.9	7.0 V	
width tpÿ300µs, ÿÿ2%						
Dynamic characteristics						
Cies input capacitance		VCE=30V,VGE=0V f=1MHz	-	3453	-	pF
Coes output capacitance			-	141	-	
Cres reverse transfer capacitance			-	76	-	
switching characteristics						

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td(on) turn-on delay time	VCE=400V,IC=40A, Rg=10ÿ,VGE=15V, Inductive load, TJ=25ÿ	-	56	-	ns
tr rise time td(off) turn-off		-	62	-	
delay time tf fall time turn-on loss		-	178	-	
		-	48	-	
Eon a2		-	2.1	-	mJ
Eoff turn-off loss		-	0.8	-	
Ets switch total loss td(on)		-	2.9	-	
turn-on delay time	VCE=400V,IC=40A, Rg=10ÿ,VGE=15V, Inductive load, TJ=125ÿ	-	55	-	ns
tr rise time td(off) turn-off		-	64	-	
delay time tf fall time turn-on loss		-	194	-	
		-	46	-	
Eon a2		-	2.1	-	mJ
Eoff turn-off loss		-	0.9	-	
Ets total switching loss		-	3.0	-	
Qg Total gate charge	VCE=400V,IC=40A, VGE=15V	-	239	-	nC
Qge Gate emitter charge		-	30	-	
Qgc Gate collector charge anti-parallel		-	147	-	
diode characteristics					
VF forward voltage drop	IF=40A	-	1.35	2.0 V	
trr reverse recovery time	IF=40A di/dt=200A/uS	-	48	-	ns
Irrm reverse recovery current		-	2.0	-	A
Qrr reverse recovery charge		-	106	-	nC

Note: a2: Turn-on loss includes diode loss;

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Typical electrical characteristics:

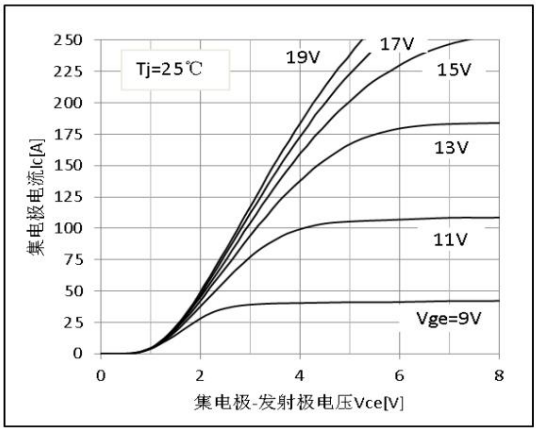


Figure 1 Output characteristic curve

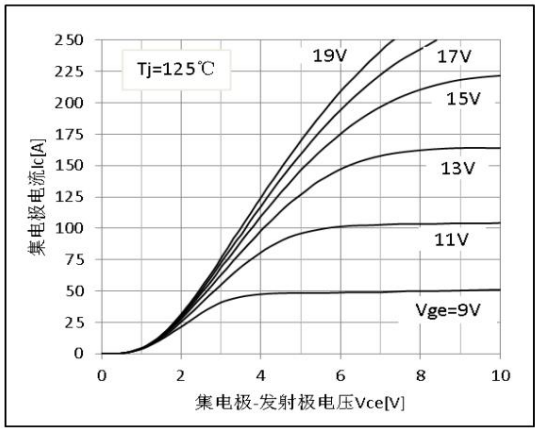


Figure 2 Output characteristic curve

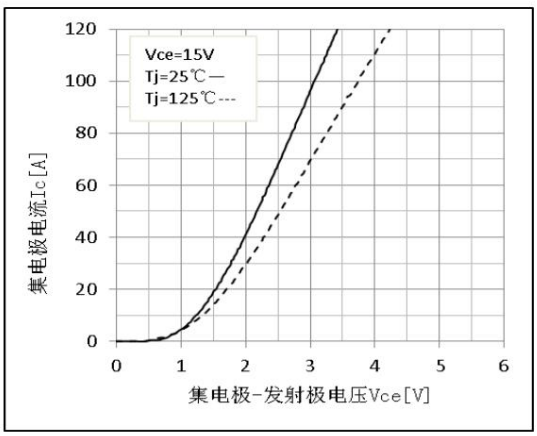


Figure 3 Saturation voltage drop characteristics

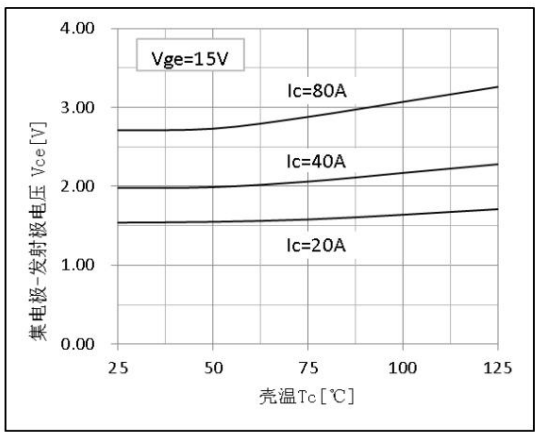


Figure 4 Saturation pressure drop temperature characteristics

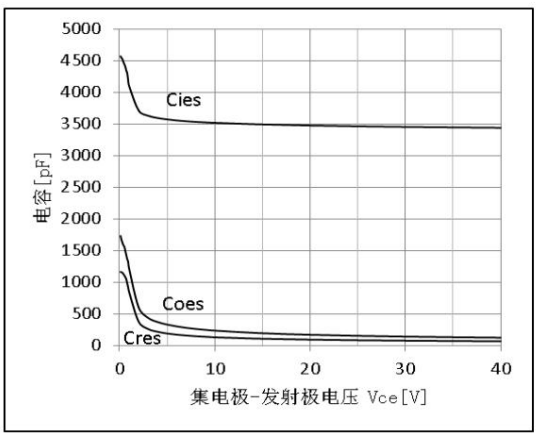


Figure 5 Capacitance characteristics

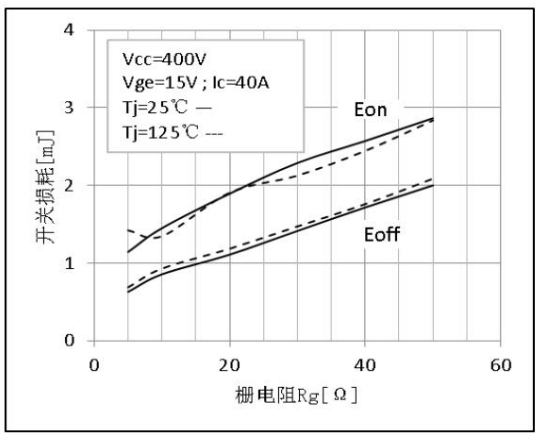


Figure 6 Switching loss-gate resistance characteristic curve

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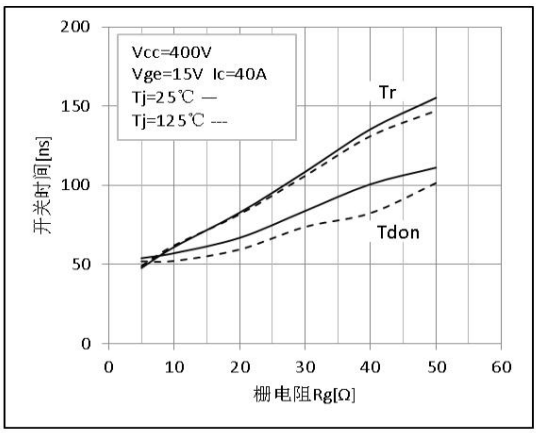


Figure 7 Turn-on-gate resistance characteristic curve

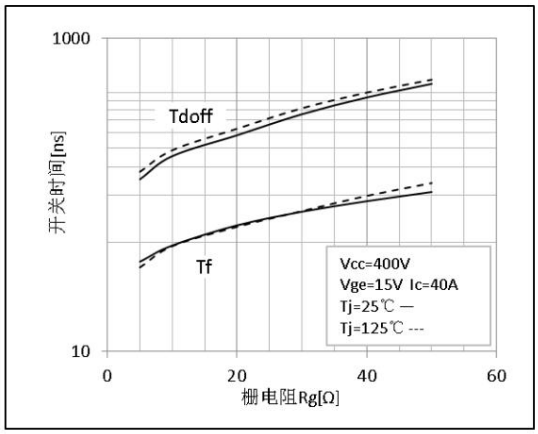


Figure 8 Turn-off-gate resistance characteristic curve

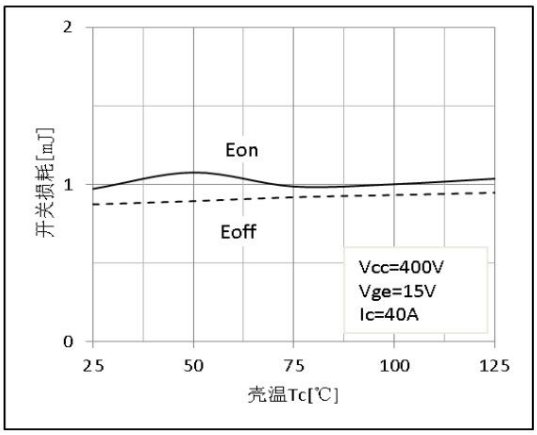


Figure 9 Switching loss temperature characteristics

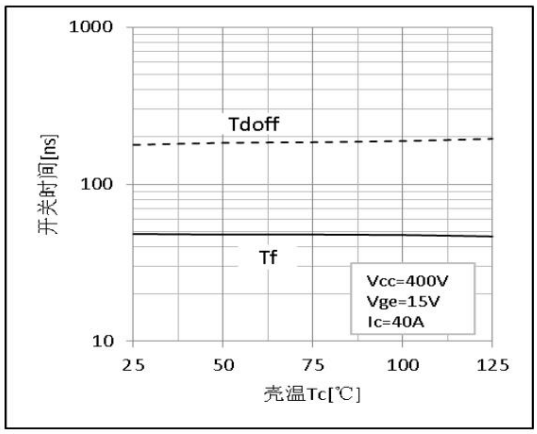


Figure 10 Shutdown temperature characteristics

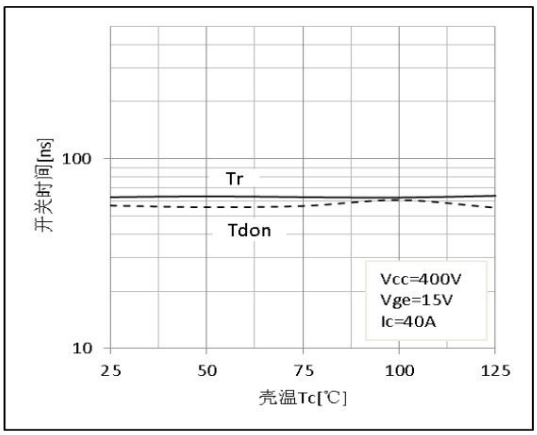


Figure 11 Temperature characteristics of opening

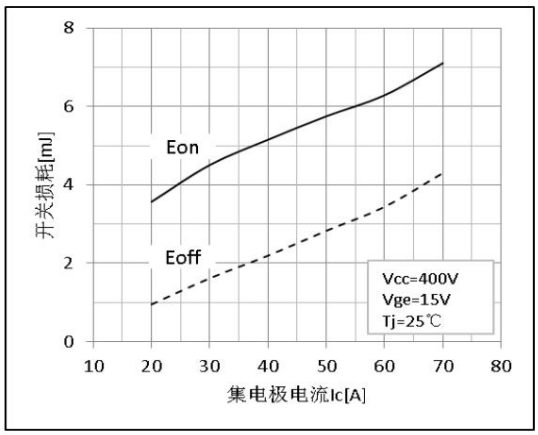


Figure 12 Current characteristics of switching loss

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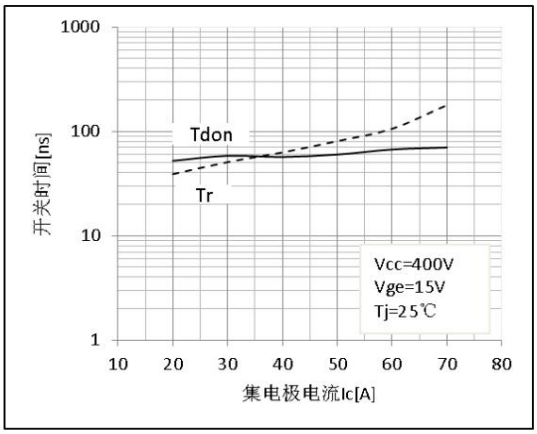


Figure 13 Current characteristics at turn-on

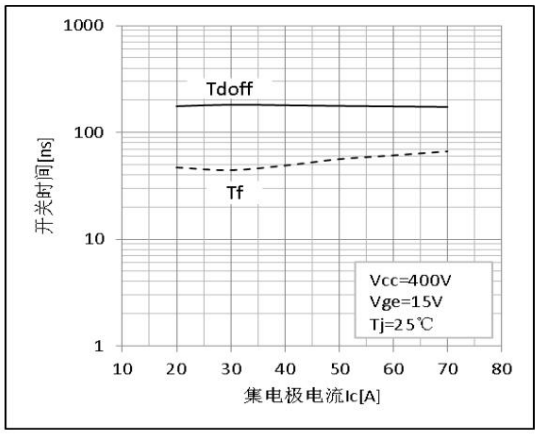


Figure 14 Shutdown current characteristics

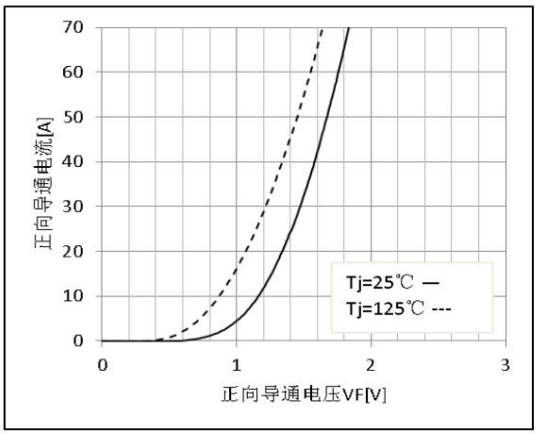


Figure 15 Diode forward characteristics

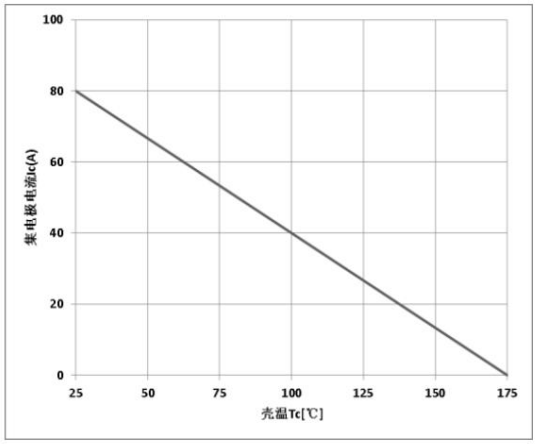


Figure 16 Collector current temperature characteristics

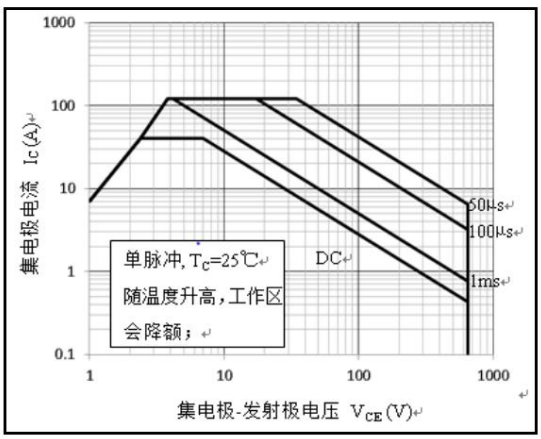


Figure 17 Forward safe operating area

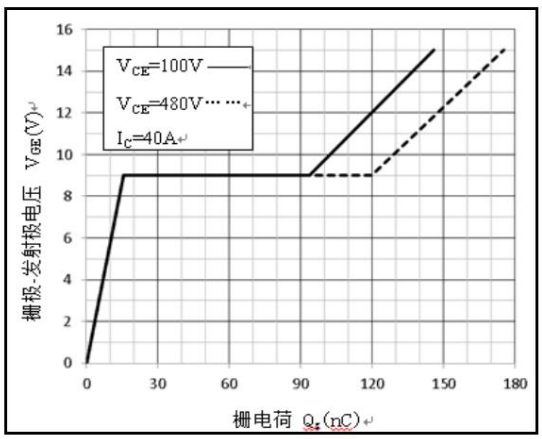


Figure 18 Gate charge characteristics

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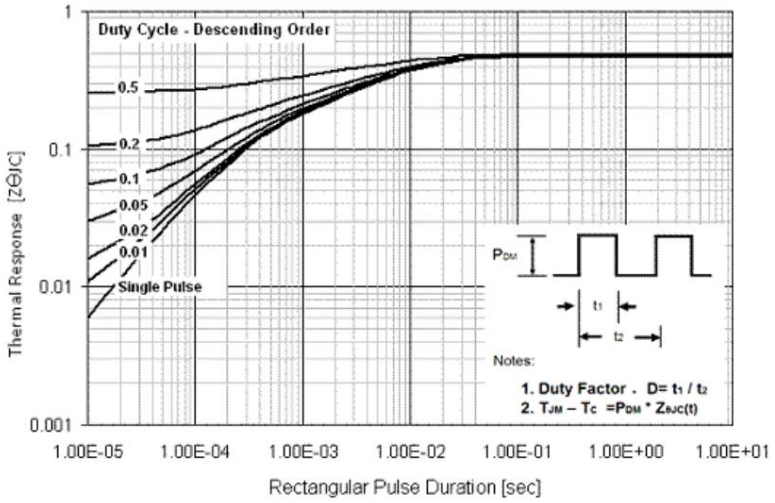
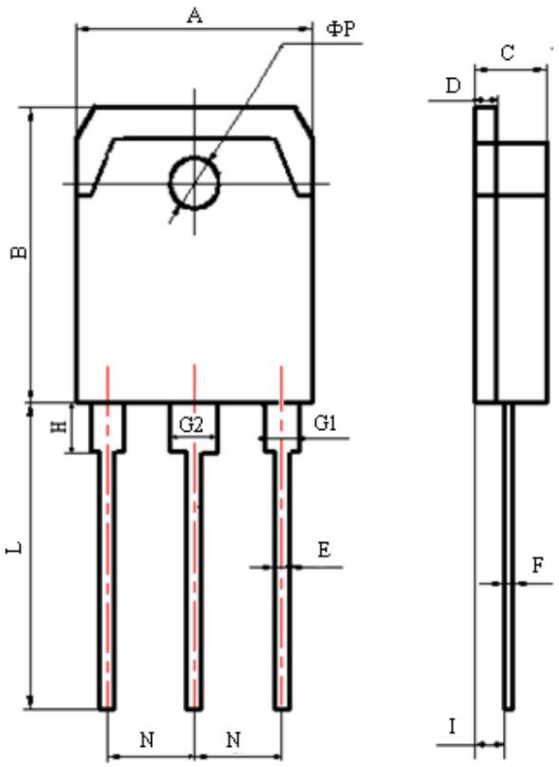


Figure 19 Transient thermal resistance characteristics

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Outline



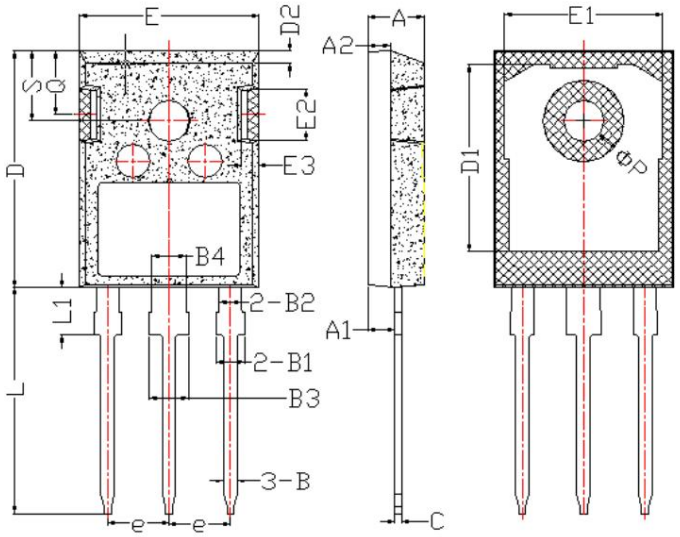
project	Specification(mm)	
	MIN	MAX
A	15.00	16.00
B	19.20	20.60
C	4.60	5.00
D	1.40	1.60
AND	0.90	1.10
F	0.50	0.70
G1	2.00	2.20
G2	3.00	3.20
H	3.00	3.70
I	1.20	1.70
	2.70	2.90
L*	19.00	21.00
N	5.25	5.65
ϕ P	3.10	3.30

*ÿadjustable

TO-3P(N) Package

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Outline



project	Specification(mm)	
	MIN	MAX
A	4.6	5.2
A1	2,2	2.6
B	0.9	1.4
B1	1.75	2.35
B2	1.75	2.15
B3	2.8	3.35
B4	2.8	3.15
C	0.5	0.7
D	20.60	21.30
D1	16	18
AND	15.5	16.10
E1	13	14.7
E2	3.80	5.3
E3	0.8	2.60
It is	5.2	5.7
L	19	20.5
L1	3.9	4.6
ÿP	3.3	3.70
Q	5.2	6.00
S	5.8	6.6

TO-247 Package

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Hazardous substances description

Part Name (Content requirements)	Toxic and hazardous substances or elements									
	lead Pb	HG Hg	cadmium Cd	Hexavalent Chromium Cr(VI)	Polybrominated Biphenyl UN	Polybrominated Phenyl ether PBDE	Phthalate Formic acid Isobutyl Ester DIBP	Phthalate Formate DEHP	Phthalate Formic acid Butyl Ester DBP	Phthalate Butyl formate Benzyl ester BBP
	ÿ0.1%	ÿ0.1%	ÿ0.01%	ÿ0.1%	ÿ0.1%	ÿ0.1%	ÿ0.1%	ÿ0.1%	ÿ0.1%	ÿ0.1%
Lead frame•		•	•	•	•	•	•	•	•	•
Plastic resin		•	•	•	•	•	•	•	•	•
Die	•	•	•	•	•	•	•	•	•	•
Inner lead		•	•	•	•	•	•	•	•	•
solder	×	•	•	•	•	•	•	•	•	•
illustrate	•: Indicates that the content of the element is below the limit requirement of 2011/65/EU standard. ×: Indicates that the content of the element exceeds the limit requirements of 2011/65/EU standard. The solder of the current product contains lead (Pb), but it is exempted from the EU RoHS directive.									

illustrate

Packaging

instructions: 1) The small package of the product is packed in anti-static strips of 25 pieces/strip;

2) The medium packaging of the product is in a medium-sized paper box with 40 strips per box;

3) Large packaging of products, using large cardboard boxes of 2 boxes/cartons;

Precautions:

1

) All products shipped by China Resources Huajing meet the electrical parameters and external dimensions requirements of the corresponding specifications; for products with special requirements of customers, the two parties shall sign relevant technical agreements.

2 ÿIt is recommended that the device be used below 80% of the maximum rating; during installation, pay attention to reducing the generation of mechanical stress to prevent product failure caused by it.

Avoid being close to heating components; pay attention to controlling the temperature and time when soldering.

3 ÿ ÿ IGBT devices are sensitive to static electricity. Pay attention to static electricity protection before use to avoid static electricity breakdown.

4 This specification book is produced by China Resources Huajing Company and is continuously updated. No special notice will be given when it is updated.

contact method

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