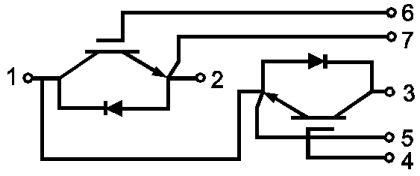
GT400HF65T2VH-M

IGBT Module

Features：



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

Applications：

- High Power Converters
- Industrial Motor Drives
- UPS Systems

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

V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C=100℃	400	A
		T_C=25℃	630	A
I_{CM}	Repetitive Peak Collector Current	T_J=175℃	800	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	T_C=25℃ T_{Jmax}=175℃	1650	W

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

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=6.4mA, V_{CE}=V_{GE}		5.0	5.9	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=400A, V_{GE}=15V	T_J=25℃		1.70	2.00	V
			T_J=125℃		2.00		V
			T_J=150℃		2.00		
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℃				300	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			32.6		nF
C_{oes}	Output Capacitance				1.82		nF
C_{res}	Reverse Transfer Capacitance				0.50		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=300V, I_C=400A, R_{Gon}=1Ω, V_{GE}=+15V/-8V Inductive Load	T_J=25℃		284		ns
			T_J=125℃		275		
			T_J=150℃		269		
t_r	Rise Time		T_J=25℃		285		ns
			T_J=125℃		285		
			T_J=150℃		284		
$t_{d(off)}$	Turn-off Delay Time	V_{CC} = 300V, I_C=400A, R_{Goff}=1Ω, V_{GE}=+15V/-8V Inductive Load	T_J=25℃		366		ns
			T_J=125℃		371		
			T_J=150℃		375		
t_f	Fall Time		T_J=25℃		142		ns
			T_J=125℃		152		
			T_J=150℃		156		
E_{on}	Turn-on Switching Loss	V_{CC}=300V, I_C=400A, R_{Gon}=1Ω, V_{GE}=+15V/-8V di/dt=1211A/μs(T_J=150℃), Inductive Load	T_J=25℃		4.1		mJ
			T_J=125℃		5.3		
			T_J=150℃		5.8		

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E_{off}	Turn-off Switching Loss	V_{CC}=300V, I_C=400A, R_{Goff}=1Ω, V_{GE}=+15V/-8V du/dt=2678V/μs(T_J=150℃), Inductive Load	T_J=25℃		27.5		mJ
			T_J=125℃		29.2		
			T_J=150℃		30		
Q_g	Total Gate Charge	V_{GE}=+15V…-8V	T_J=25℃		1.72		μC
RBSOA	I_C=800A, V_{CC}=480V, Vp=650V, R_{Goff}=1Ω, V_{GE}=+15V to 0V, T_J =150°C			Trapezoid			
SCSOA	V_{CC}=300V, V_{GE}=+15V/-8V, T_J=150℃			10			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case (per leg)					0.091	℃/W

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

V_{RRM}	Repetitive Peak Reverse Voltage	650	V
I_F	Diode Continuous Forward Current	400	A
I_{FM}	Diode Maximum Forward Current	800	A

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V_{FM}	Forward Voltage	I_F=400A	T_J=25℃		2.00		V
			T_J=125℃		2.00		
			T_J=150℃		2.10		
t_{rr}	Reverse Recovery Time	I_F=400A, -di_F/dt =1271A/μs(T_J=150℃), V_R=300V, V_{GE}=-8V	T_J=25℃		184		ns
			T_J=125℃		249		
			T_J=150℃		277		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		69		A
			T_J=125℃		119		
			T_J=150℃		131		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		7.8		μC
			T_J=125℃		18.3		
			T_J=150℃		22.5		

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E_{rec}	Reverse Recovery Energy	I_F=400A, $-di_F/dt$ =1271A/μs(T_J=150℃), V_R=300V, V_{GE}=-8V	T_J=25℃		0.86		mJ
			T_J=125℃		3.17		
			T_J=150℃		4.37		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per leg)					0.179	℃/W

Module

Symbol	Description		Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 30s	4500			V
T_J	Maximum Junction Temperature				175	℃
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)				0.03	℃/W
T	Power Terminals Screw:M6		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			300		g

Ordering Information Table

Device code

G	T	400	HF	65	T2V	H	—	M
①	②	③	④	⑤	⑥	⑦		⑧

① - IGBT Module
② - Trench, Low Switching Losses IGBT
③ - Rated Current (400=400A)
④ - Circuit Configuration: HF (Half Bridge)
⑤ - Rated Voltage (65=650V)
⑥ - Package Type
⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)
⑧ - Internal Code

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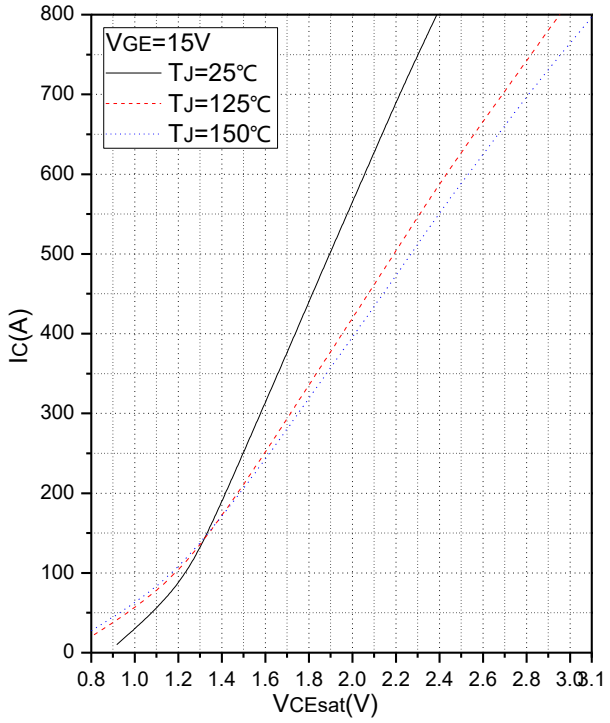

Fig.1 Typical Saturation Voltage Characteristics

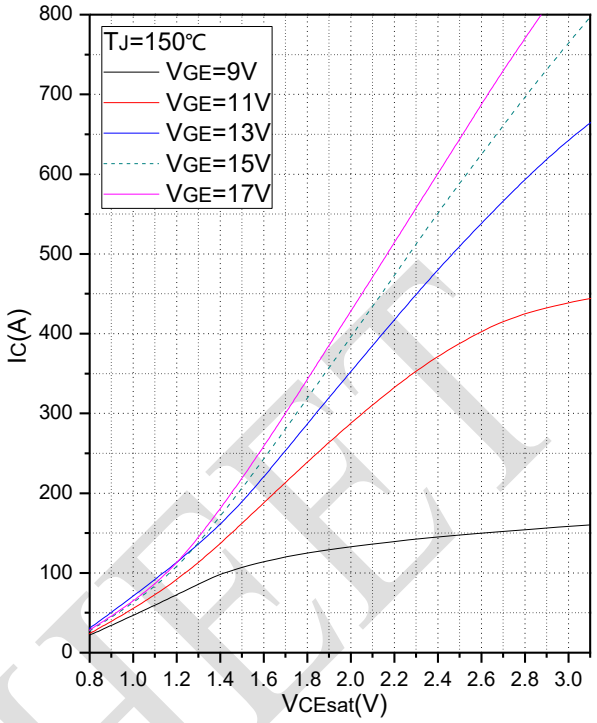

Fig.2 Typical Output Characteristics

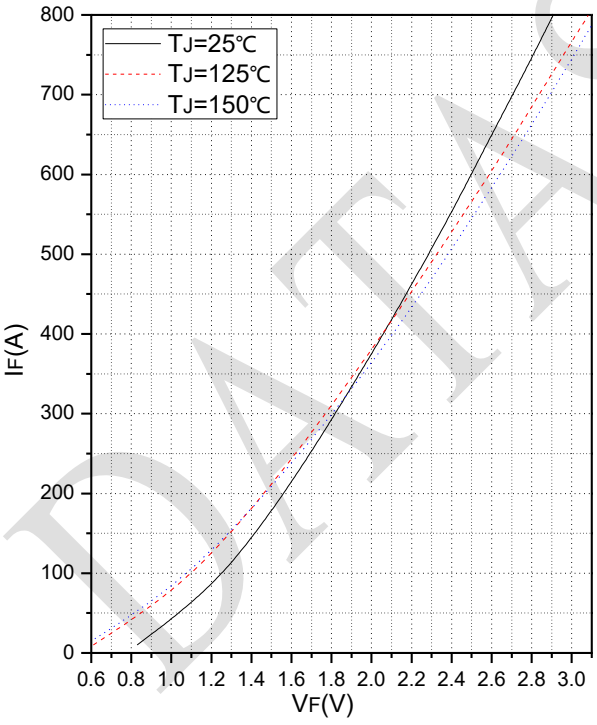

Fig.3 Forward Characteristics of Diode

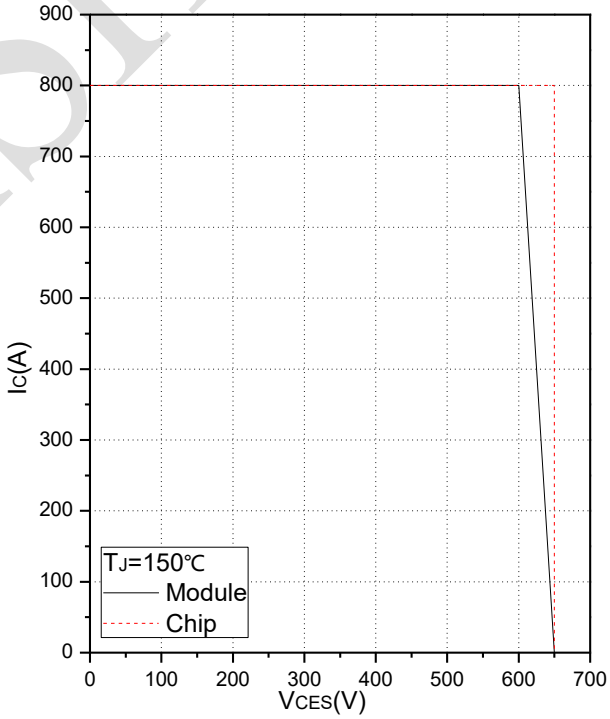

Fig.4 Reverse Bias Safe Operation Area (RBSOA)

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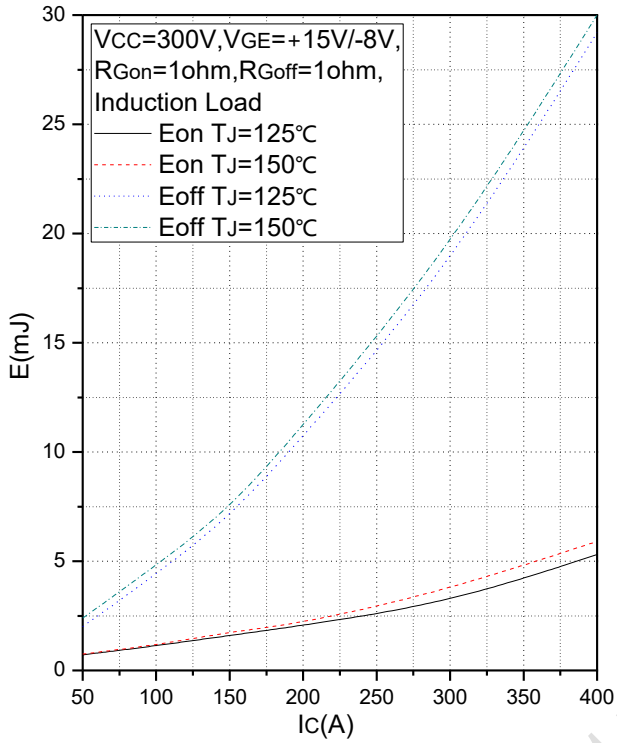

Fig.5 Typical Switching Loss vs. Collector Current

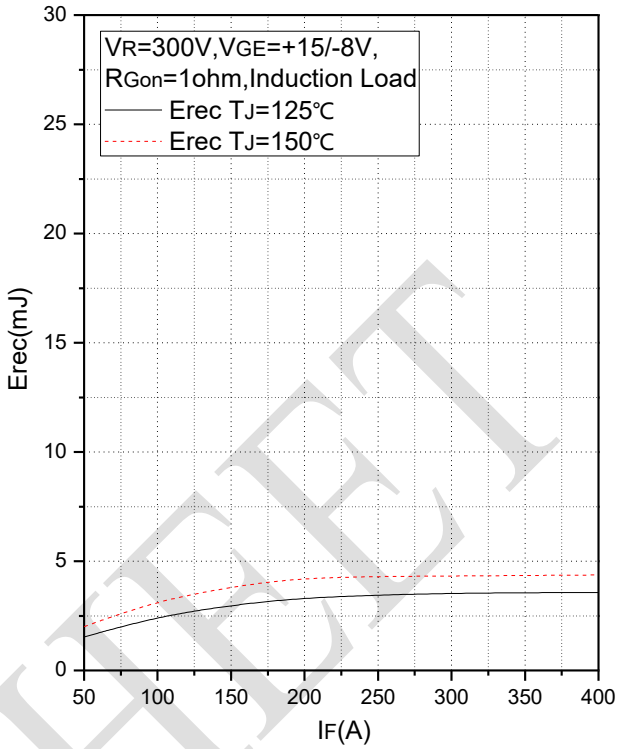

Fig.6 Typical Switching Loss vs. Forward Current

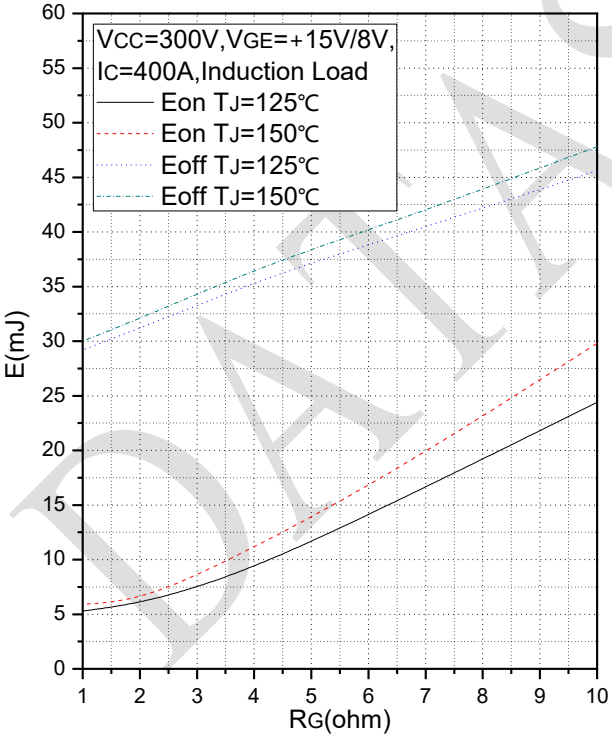

Fig.7 Typical Switching Loss vs. Gate Resistance

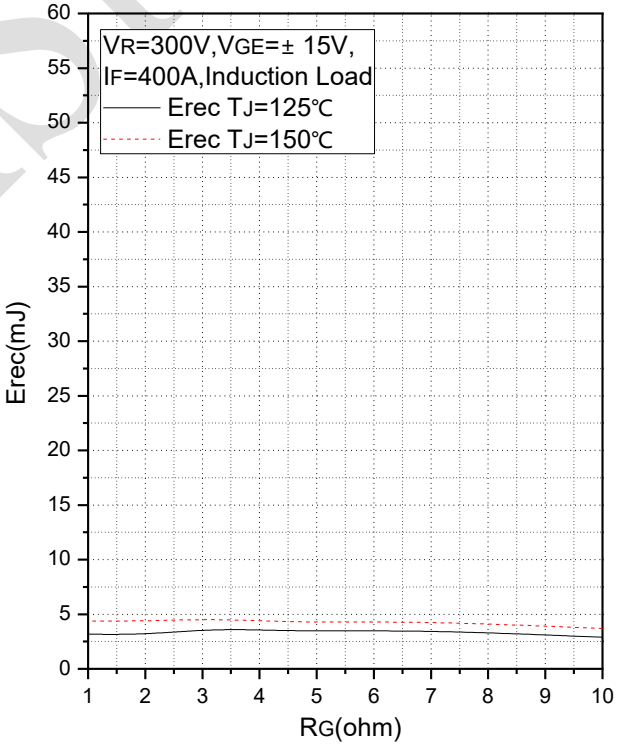

Fig.8 Typical Switching Loss vs. Gate Resistance

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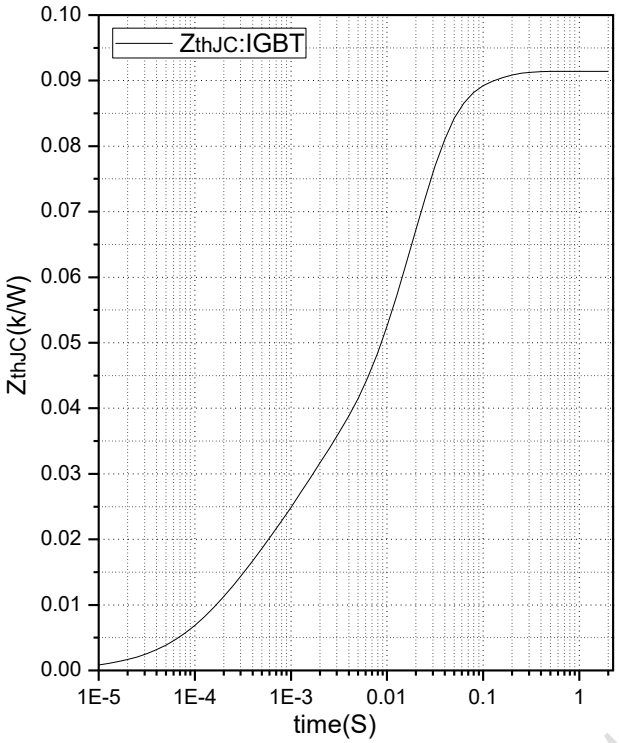

Fig.9 Transient Thermal Impedance (IGBT)

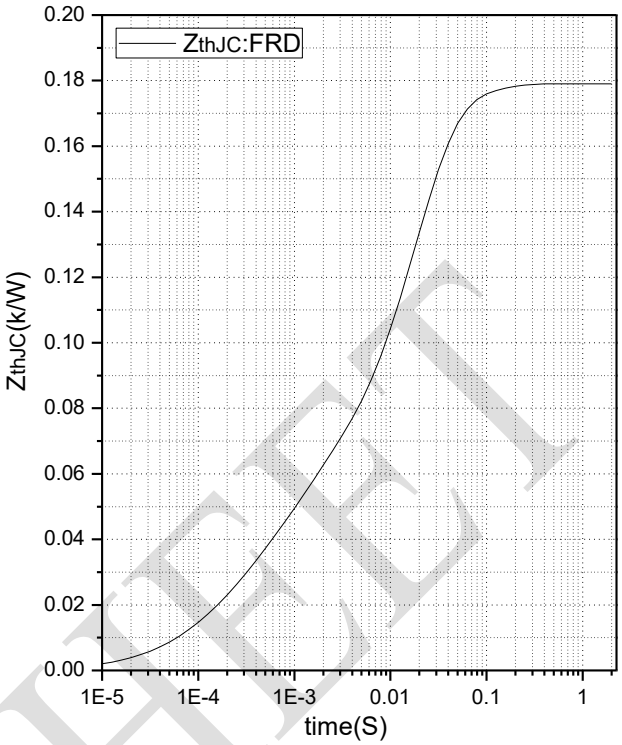

Fig.10 Transient Thermal Impedance (Diode)

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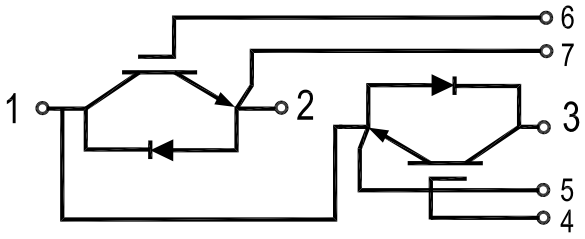
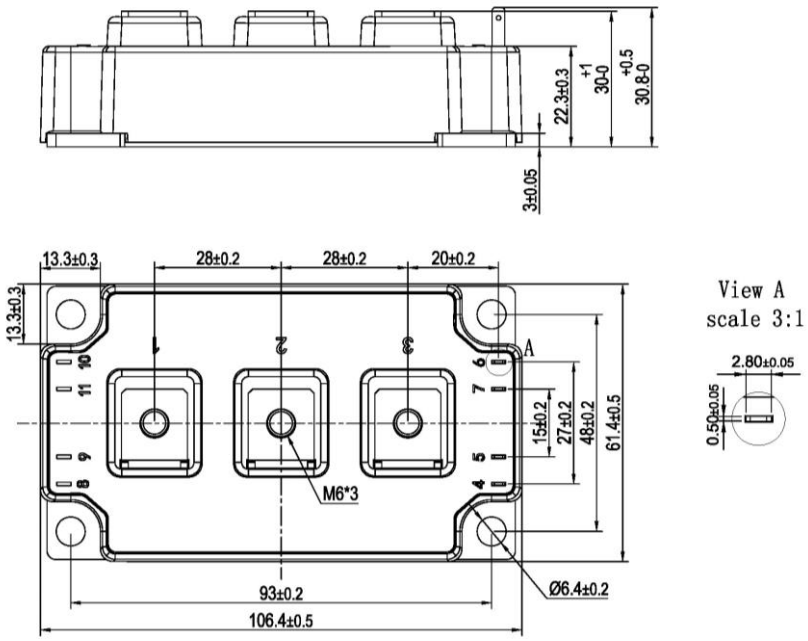
Internal Circuit



Package Outline (Unit: mm):



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Date	Revision	Notes
10/15/2018	01	Initial Release
03/23/2023	A	Final Version

Announcement

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