

**CGWT40N65F2KAD**

V_{CE}	$I_c (T_c=100^\circ\text{C})$	$V_{CE(sat)}$
650V	40A	1.7V

TO-247**DESCRIPTION**

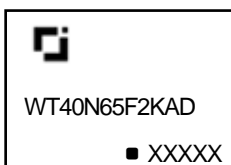
The CGWT40N65F2KAD is used JSCJ's second generation IGBT technology, has advanced Trench and FS(Field Stop) Structure, it's with high application frequent, low Collector-Emitter Saturation Voltage and switching loss, can easy to use in parallel.

Features

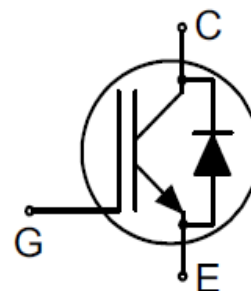
- 650V breakdown Voltage
- Low $V_{ce(sat)}$ and positive temperature coefficient
- High speed switching, Low switching loss
- With fast and soft recovery freewheeling diode
- Good EMI behavior

Application

- UPS & FPC applications
- Solar Inverter
- EV Charger
- Power Storage
- Welder

MARKING

WT40N65F2KAD = Device code
Solid dot = Green molding compound device, if none, the normal device
XXXXX = Code

EQUIVALENT CIRCUIT

Order Code	Package	Marking	Parking
CGWT40N65F2KAD	TO-247	WT40N65F2KAD	Tube

Absolute Maximum Ratings ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 20	V
	Gate-Emitter transient voltage	± 30	V
I_C	Collector Current ⁽²⁾	80	A
	Collector Current @ $T_C=100^{\circ}\text{C}$	40	
I_{Cpluse}	Plused Collector Current, tp limited by T_{Jmax}	120	A
$I_{LM}^{(1)}$	Turn-off latching current	120	A
I_F	Continuous Diode Forward Current ⁽²⁾	80	A
	Continuous Diode Forward Current @ $T_C=100^{\circ}\text{C}$	40	A
I_{FM}	Diode Pulsed Current, Limited by T_{Jmax}	120	A
tsc	Short Circuit Withstand Time, $V_{GE}=15\text{V}$, $V_{CE}\leq 400\text{V}$, Allowed number of short circuits < 1000, Time between short circuits $\geq 1.0\text{s}$, $T_J=150^{\circ}\text{C}$	5	us
P_D	Power Dissipation @ $T_C=25^{\circ}\text{C}$	250	W
	Power Dissipation @ $T_C=100^{\circ}\text{C}$	125	
T_J	Junction Temperature	-40 to 175	$^{\circ}\text{C}$
T_{STG}	Storage Temperature	-55 to 150	$^{\circ}\text{C}$
T_L	Maximum lead temperature for soldering	260	$^{\circ}\text{C}$

- (1) $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $T_J\leq 150^{\circ}\text{C}$.
(2) value limited by bondwire

Thermal Characteristics

Symbol	Parameter	Value	Units
$R\theta_{JC}$	Maximum IGBT Junction-to-Case	0.6	$^{\circ}\text{C}/\text{W}$
$R\theta_{JC}$	Maximum Diode Junction-to-Case	1.8	$^{\circ}\text{C}/\text{W}$
$R\theta_{JA}$	Maximum Junction-to-Ambient	40	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Ration			Unit s	
			Min.	Typ.	Max.		
STATIC PARAMETERS							
V _{(BR)CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V, I _{CE} =250uA	650	--	--	V	
I _{CES}	Zero Gate Voltage Collector Current	V _{GE} =0V, V _{CE} =650V	--	--	1.0	mA	
I _{GES}	Gate-Emitter leakage current	V _{GE} =±20V	--	--	±250	nA	
		V _{GE} =±30V	--	--	±500	nA	
V _{GE(th)}	Gate-Emitter Threshold Voltage	I _C =1mA, V _{CE} =V _{GE}	4	--	6.5	V	
V _F	Diode Forward Voltage	I _F =40A, T _C =25°C	--	1.56	--	V	
		I _F =40A, T _C =125°C	--	1.30	--	V	
		I _F =40A, T _C =150°C	--	1.23	--	V	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =40A, V _{GE} =15V, T _J =25°C	--	1.7	--	V	
		I _C =40A, V _{GE} =15V, T _J =125°C	--	2.0	--	V	
		I _C =40A, V _{GE} =15V, T _J =150°C	--	2.1	--	V	
DYNAMIC PARAMETERS							
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V f=1MHz	--	1819	--	pF	
C _{oes}	Output Capacitance		--	175	--		
C _{res}	Reverse Transfer Capacitance		--	22	--		
R _g	Gate Resistance	V _{GE} =0V, CE short, f=1MHz	--	1.6	--	Ω	
SWITCHING PARAMETERS							
t _{d(on)}	Turn-On Delay Time	V _{CE} =400V, I _C =40A, R _g =10Ω, V _{GE} =15V, Inductive Load T _J =25°C	--	21	--	ns	
t _r	Current Rise Time		--	46	--		
t _{d(off)}	Turn-Off Delay Time		--	67	--		
t _f	Current Fall Time		--	34	--		
E _{on} ⁽³⁾	Turn-On Switching Energy		V _{CE} =480V, I _C =40A, V _{GE} =15V	--	1.23	--	mJ
E _{off}	Turn-Off Switching Energy			--	0.34	--	
E _{is}	Total Switching Energy			--	1.57	--	
Q _G	Total Gate Charge		V _{CE} =480V, I _C =40A, V _{GE} =15V	--	79.2	--	nC
Q _{GE}	Gate to Emitter Charge	--		19.3	--	nC	
Q _{GC}	Gate to Collector Charge	--		44.8	--	nC	
t _{rr}	Diode reverse recovery time	V _R = 400V, I _F = 40A, diF/dt = 100A/μs	--	74	--	nS	
Q _{rr}	Diode reverse recovery charge		--	144	--	nC	
I _{rm}	Diode peak reverse recovery current		--	3.7	--	A	

(3) Including the reverse recovery of the diode.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

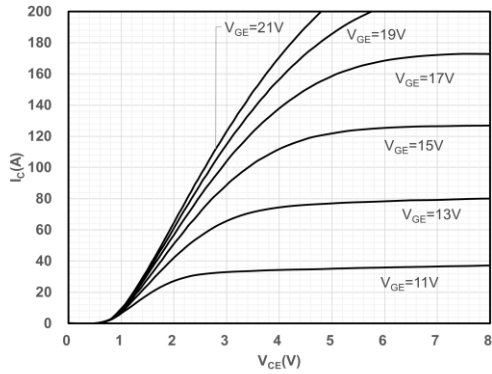


Figure 1: Output Characteristic
($T_j=25^{\circ}\text{C}$)

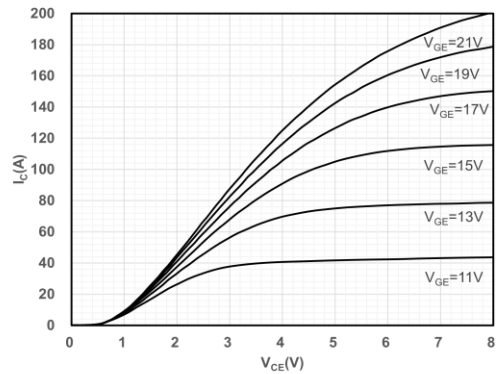


Figure 2: Output Characteristic
($T_j=150^{\circ}\text{C}$)

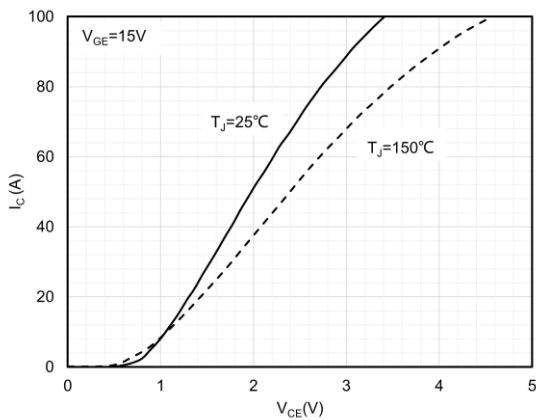


Figure 3: Collector-Emitter Saturation Voltage

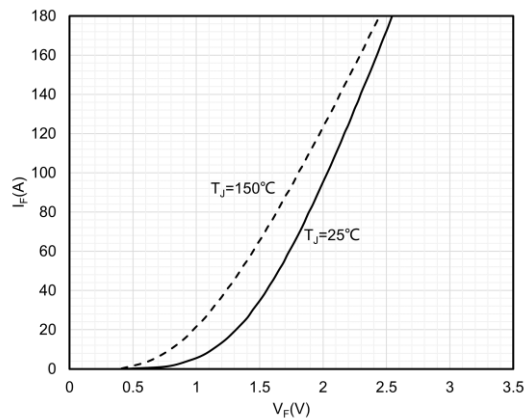


Figure 4: Diode Characteristic

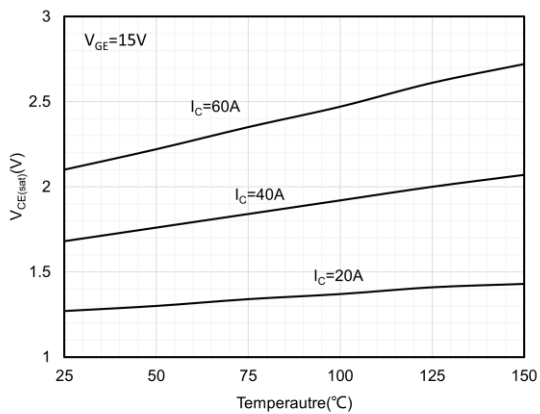


Figure 5: Collector-Emitter Saturation Voltage vs.
Junction Temperature

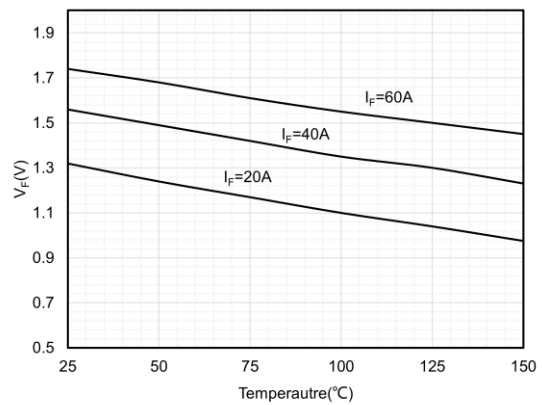


Figure 6: Diode Forward voltage vs. Junction
Temperature

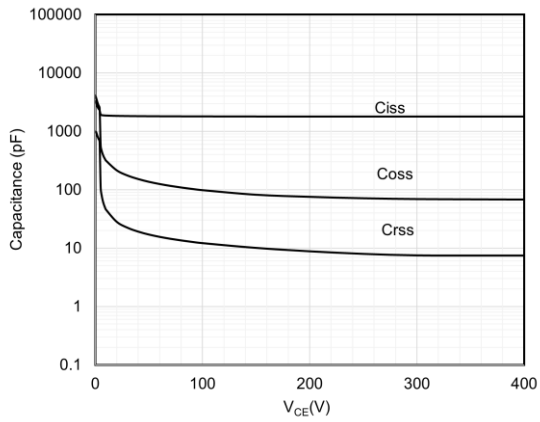


Figure 7: Capacitance Characteristic

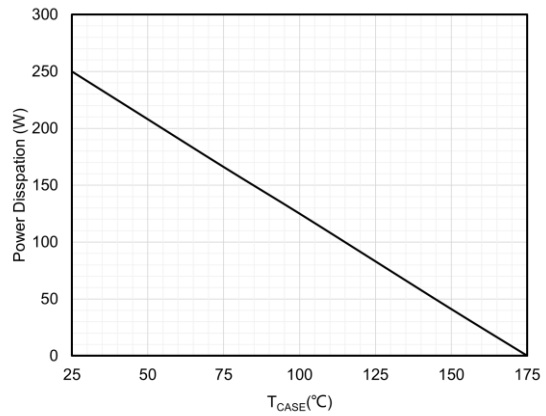


Figure 8: Power Dissipation as a Function of Case

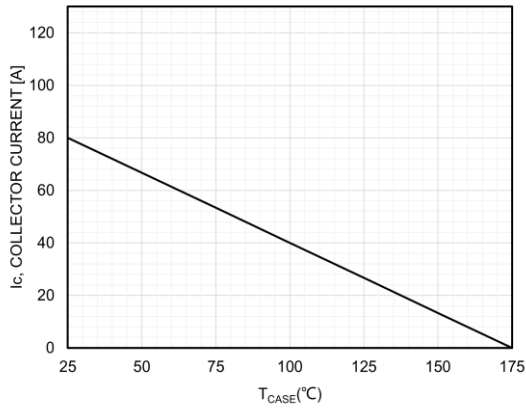


Figure 9: Collector Current as a Function of Case

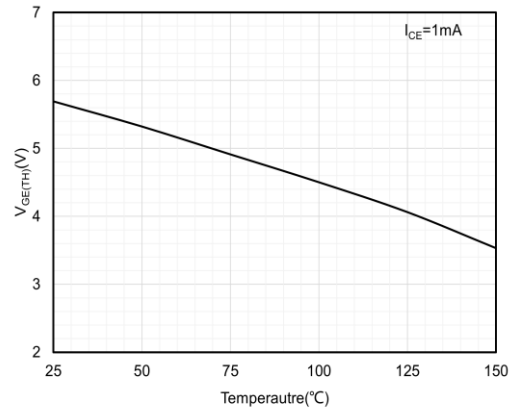


Figure 10: VGE(TH) vs. T_J

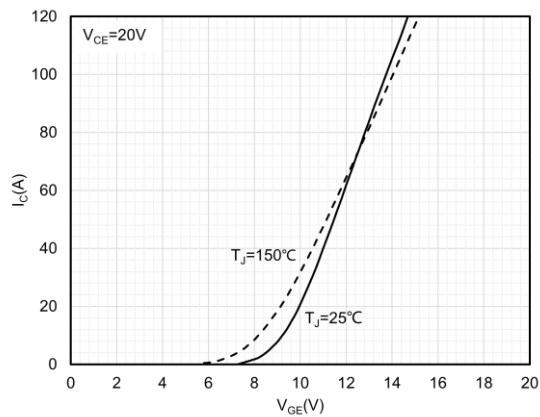


Figure 11: Transfer Characteristic

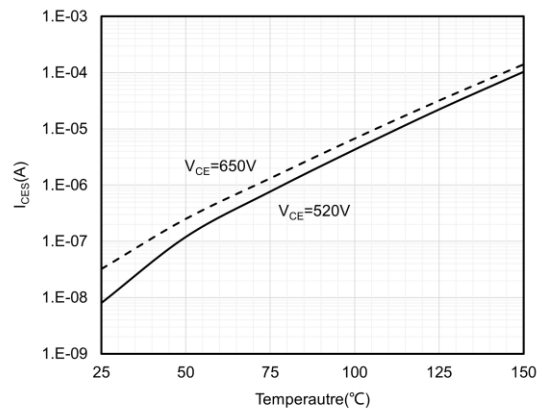


Figure 12: Reverse Leakage Current vs. T_J

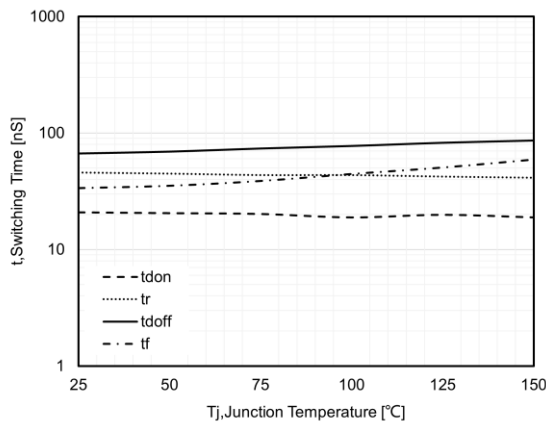


Figure 13 Typical switching times as a function of junction temperature

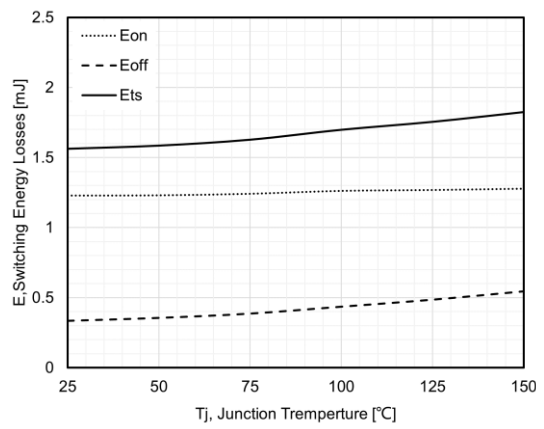
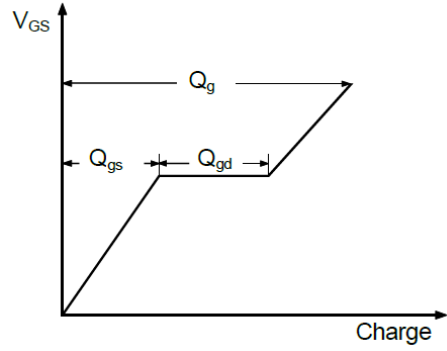
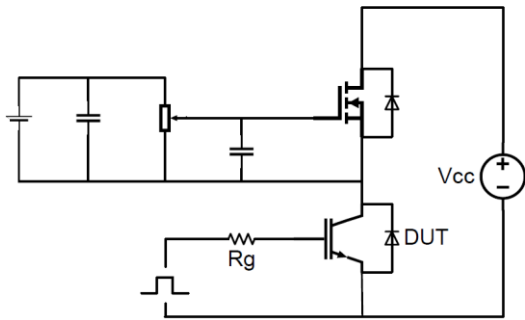


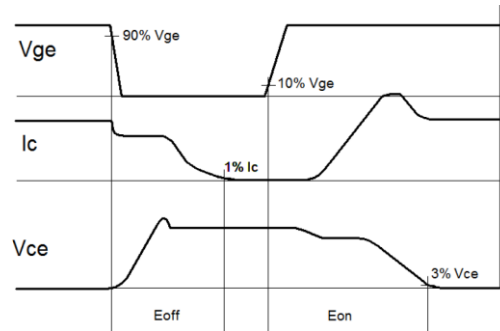
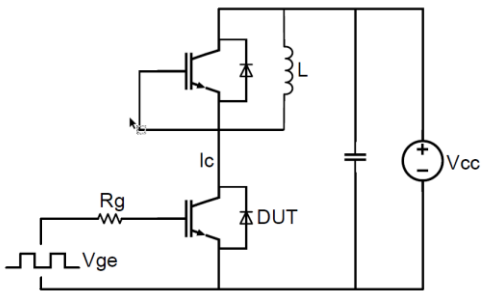
Figure 14 Typical switching energy losses as a function of junction temperature

TEST CIRCUIT AND WAVEFORMS

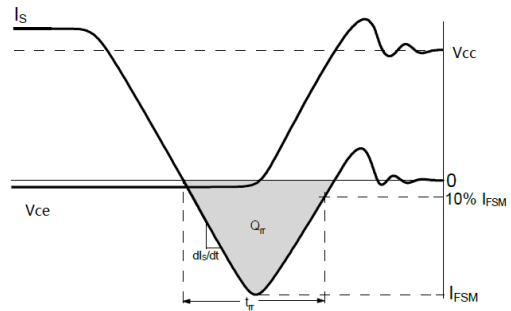
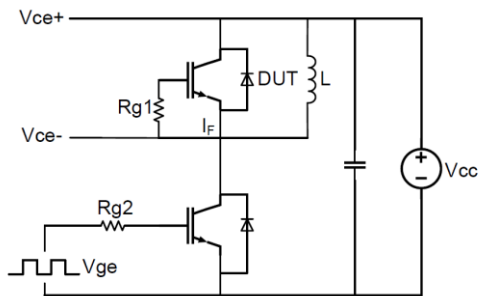
Gate Charge



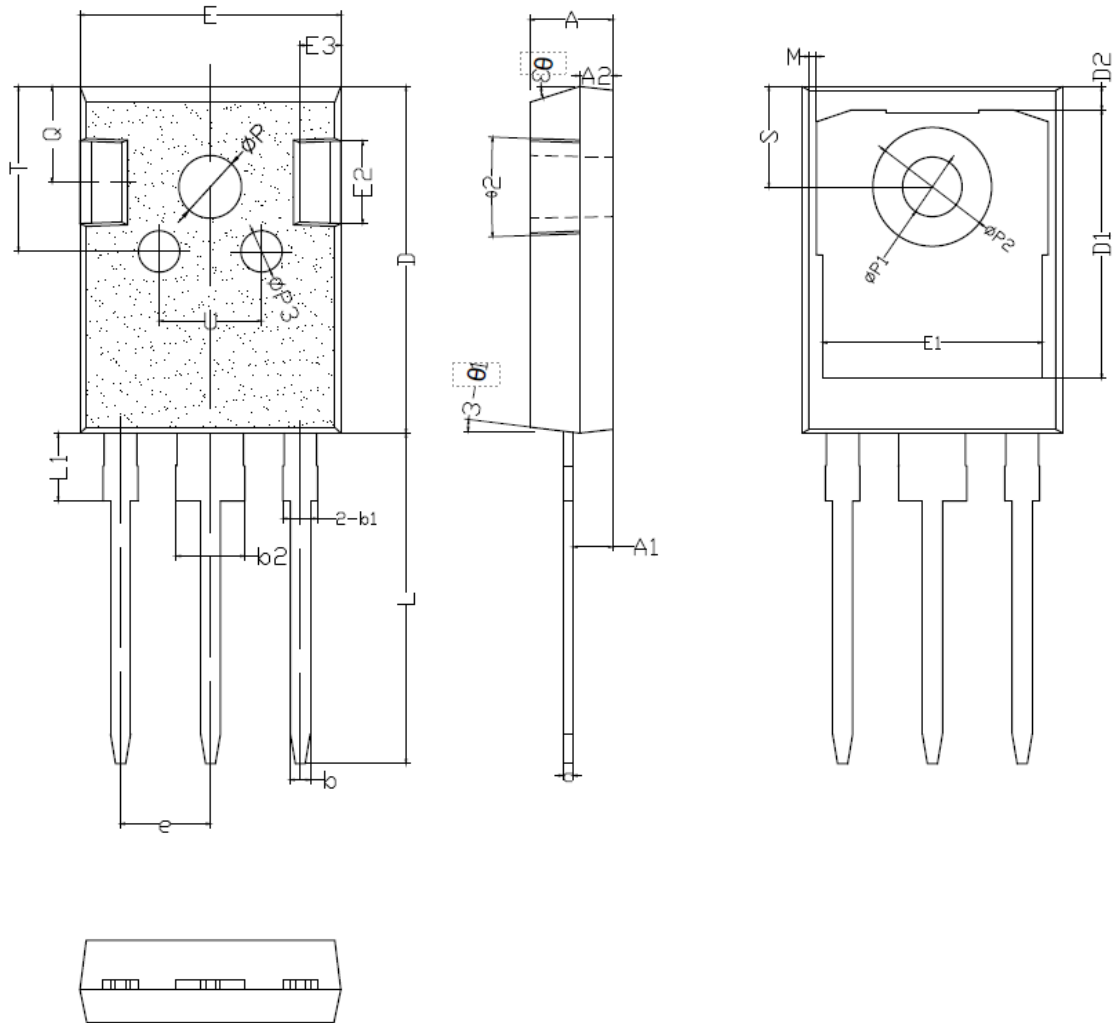
Inductive Switching Test Circuit



Diode Reverse Recovery



TO-247 PACKAGE OUTLINE DIMENSIONS



SYMBOL	mm		
	MIN	NOM	MAX
*A	4.90	5.00	5.10
*A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
*b	1.15	1.20	1.25
*b1	1.95	2.10	2.25
*b2	2.95	3.10	3.25
*c	0.55	0.60	0.65
*D	20.90	21.00	21.10
D1	16.35	16.55	16.75
D2	1.05	1.20	1.35
*E	15.70	15.80	15.90

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E1	13.10	13.25	13.40
E2	4.85	4.95	5.10
E3	2.40	2.50	2.60
*e	5.40	5.44	5.48
*L	19.80	19.98	20.15
*L1	-	-	4.30
*ΦP	3.40	3.50	3.60
*ΦP1	6.90	7.10	7.30
ΦP2	2.40	2.50	2.60
ΦP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
*S	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	13°	15°	17°
*为管控尺寸			

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[IHF40N65R5S](#) [IKW08N120CS7XKSA1](#) [IKQ75N120CH3](#) [IHW30N160R5](#) [SGM100HF12A1TFD](#) [CRG50T60AK3SD](#) [CRG40T60AN3S](#)