Descriptions

This is 650V 30A Trench FS Technology IGBT in a TO-247 Plastic Package.

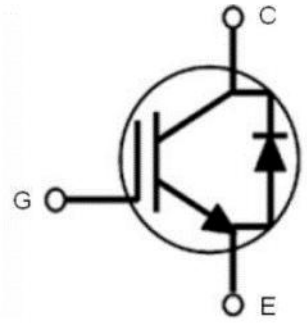
Features

- High ruggedness performance
- 10 μ s short circuit capability
- Positive VCE(sat) temperature coefficient
- High efficiency for motor control
- Excellent current sharing in parallel operation
- RoHS compliant

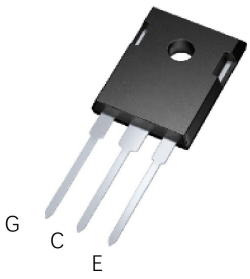
Applications

- Motor Drives
- Home Appliance Applications
- General inverter

Equivalent Circuit & Pinning



TO-247



Marking

See Marking Instructions

Maximum Ratings

Parameter	Symbol	Test Condition	Values	Unit
Collector to Emitter Voltage	V_{CES}		650	V
Gate to Emitter Voltage	V_{GES}		±20	V
Collector Current	I_C	T_C=25℃	60	A
		T_C=100℃	30	
Pulsed Collector Current	I_{CM}	Pulse width limited by T_{Jmax}	120	A
Diode Continuous Forward Current	I_F	T_C=100℃	30	A
Maximum Power Dissipation	P_D	T_C=25℃	187	W
		T_C=100℃	93	
Operating Junction Temperature Range	T_J		-40~+175	℃
Storage Temperature Range	T_{STG}		-55~+150	℃
Thermal Resistance, Junction to case for IGBT	$R_{th(J-C)}$		0.8	℃/W
Thermal Resistance, Junction to case for Diode	$R_{th(J-C)}$		1.8	℃/W
Thermal Resistance, Junction to Ambient	$R_{th(J-A)}$		40	℃/W

Electrical Characteristics of IGBT

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Collector to Emitter Breakdown Voltage	BV_{CES}	I_C=250uA, V_{GE}=0V	T_J=25℃	650	-	-	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=30A, V_{GE}=15V	T_J=25℃	-	1.7	-	V
Gate Threshold Voltage	$V_{GE(th)}$	I_C=1mA, V_{GE}= V_{CE}	T_J=25℃	5.3	5.7	5.9	V
Zero Gate Voltage Collector current	I_{CES}	V_{CE}=650V, V_{GS}=0V	T_J=25℃	-	-	50	μA
Gate to Emitter Leakage Current	I_{GES}	V_{GE}=±20V, V_{CE}=0V	T_J=25℃	-	-	±100	nA
Input Capacitance	C_{ies}	f=1MHz, V_{CE}=25V, V_{GE}=0V	T_J=25℃	-	1978	-	pF
Output Capacitance	C_{oes}			-	100	-	
Reverse Transfer Capacitance	C_{res}			-	23	-	
Total Gate Charge	Q_g	V_{CC}=520V, I_C=30A, V_{GE}=15V		-	103	-	nc
Short Circuit Withstand Time	t_{SC}	V_{CC}=400V, V_{GE}=15V	T_J=25℃	10	-	-	μs
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=400V I_C=30A, V_{GE}=0/15V R_G=10Ω, Inductive load	T_J=25℃	-	30	-	ns
Rising Time	t_r		T_J=25℃	-	39	-	
Turn-off Delay Time	$t_{d(off)}$		T_J=25℃	-	151	-	
Falling Time	t_f		T_J=25℃	-	29	-	ns
Turn-on Switching Loss	E_{on}		T_J=25℃	-	0.95	-	mJ
Turn-off Switching Loss	E_{off}		T_J=25℃	-	0.60	-	mJ
Total Switching Energy	E_{total}		T_J=25℃	-	1.55	-	mJ
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=400V, I_C=30A, VGE=0/15V RG=10Ω, Inductive load	T_J=175℃	-	28	-	ns
Rising Time	t_r		T_J=175℃	-	40	-	ns
Turn-off Delay Time	$t_{d(off)}$		T_J=175℃	-	169	-	ns
Falling Time	t_f		T_J=175℃	-	71	-	ns
Turn-on Switching Loss	E_{on}		T_J=175℃	-	1.5	-	mJ
Turn-off Switching Loss	E_{off}		T_J=175℃	-	0.8	-	mJ
Total Switching Energy	E_{total}		T_J=175℃	-	2.3		mJ

Electrical Characteristics of Diode

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_F	I_F=30A	T_J=25℃	-	1.4	-	V
			T_J=175℃	-	1.2	-	
Diode Peak Reverse Recovery Current	I_{RM}	I_F=30A di/dt=-550A/μs V_{CC}=400V	T_J=25℃	-	16	-	A
			T_J=175℃	-	26	-	
Diode Reverse Recovery Time	t_{rr}		T_J=25℃	-	105	-	ns
			T_J=175℃	-	171	-	
Diode Reverse Recovery Charge	Q_{rr}		T_J=25℃	-	876	-	nC
			T_J=175℃	-	2650	-	

Typical Performance

Fig.1 Typical output characteristic(T_{vj}=25℃))

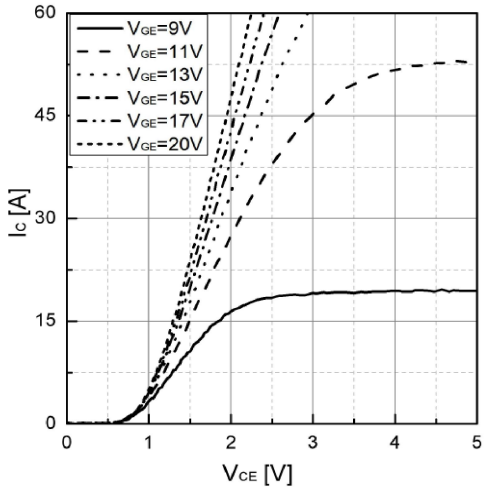


Fig.2 Typical output characteristic(T_{vj}=175℃)

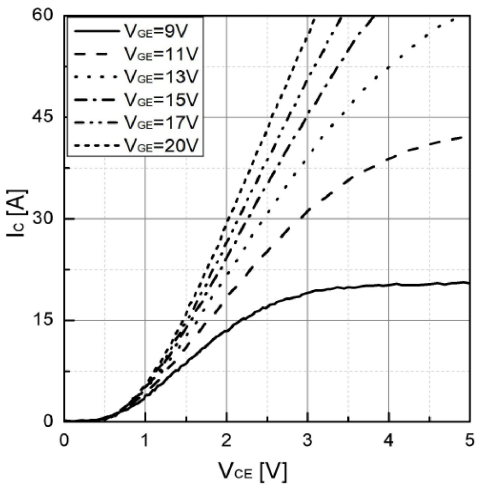


Fig.3 Power dissipation as a function of T_C

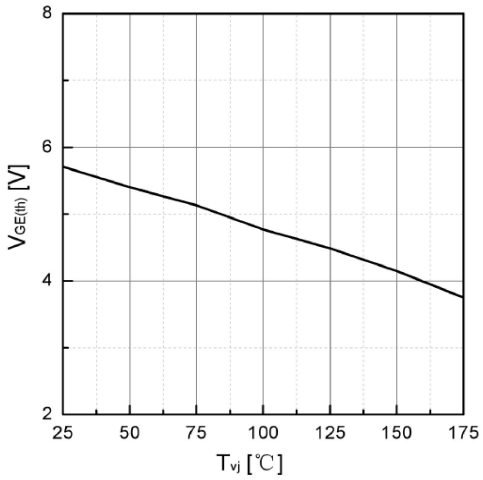


Fig.4 Typical Gate charge

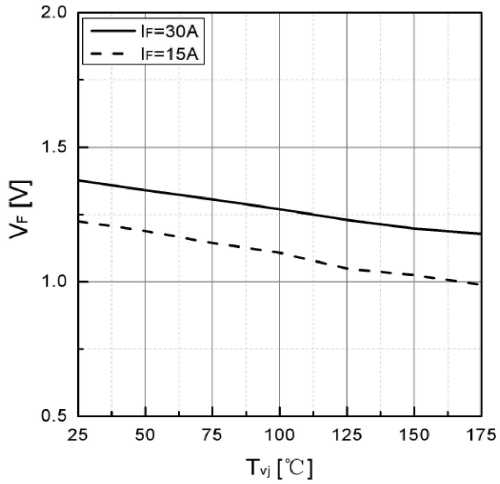


Fig.5 Typical $V_{GE(th)}$ as a function of Tvj (I_C=1mA)

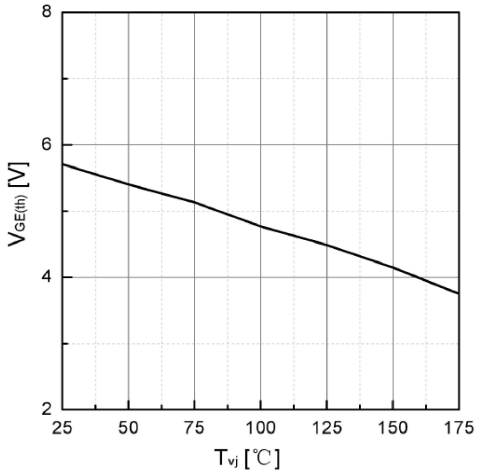
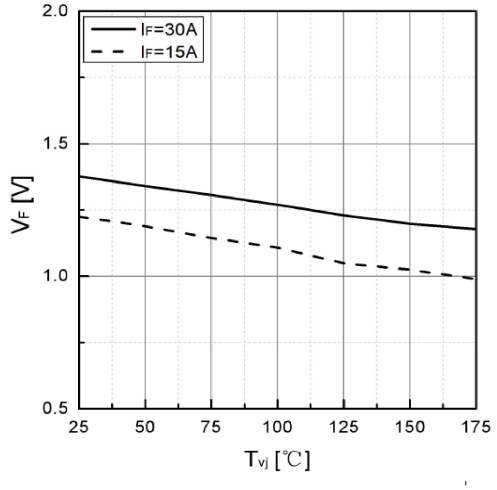


Fig.6 Typical V_F as a function of T_{vj}



Typical Performance

Fig.7 Typical V_{CEsat} as a function of T_{vj}

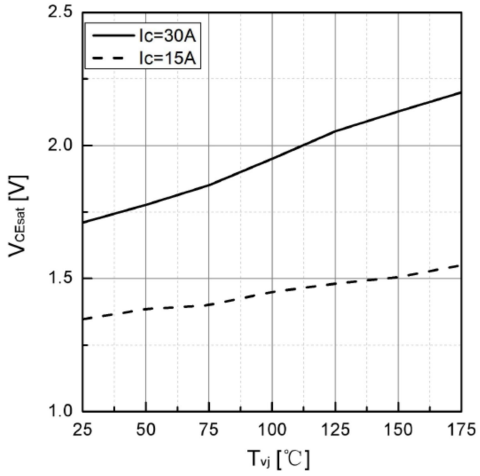


Fig.8 Typical I_F as a function of V_F

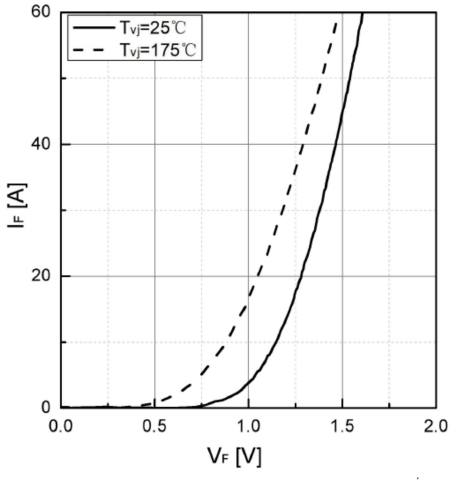


Fig.9 Typical switching time as a function of I_C

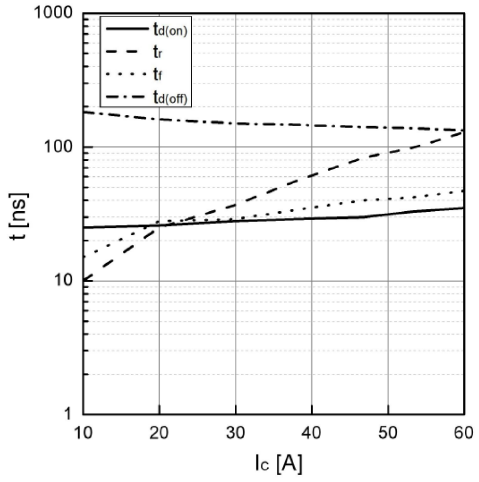


Fig.10 Typical switching times as a function of R_G

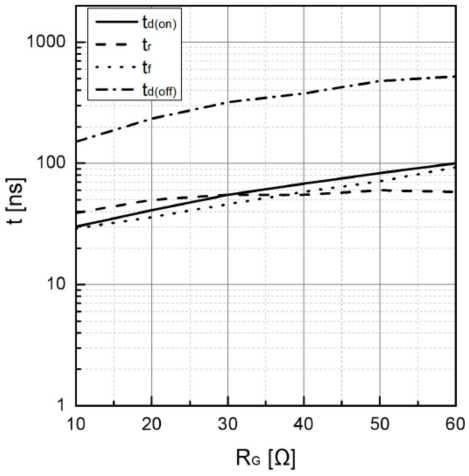


Fig 11 Typical switching energy losses as a function of I_C

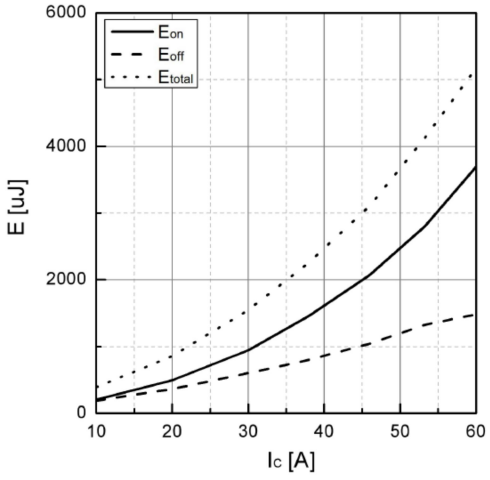
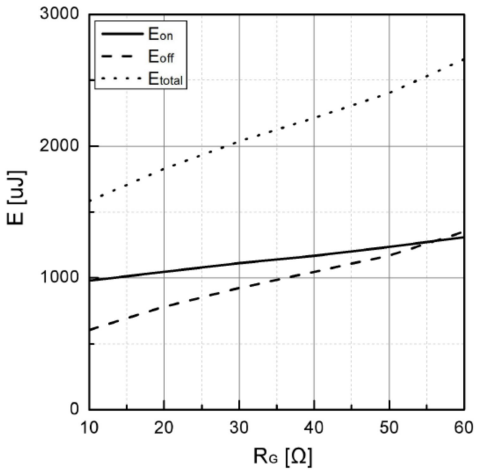


Fig 12 Typical switching energy losses as a function of R_G



Typical Performance

Fig.13 Switching Time vs. R_g
(T_J=175℃,V_{GE}=15V,V_{CE}=400V,I_C=6A)

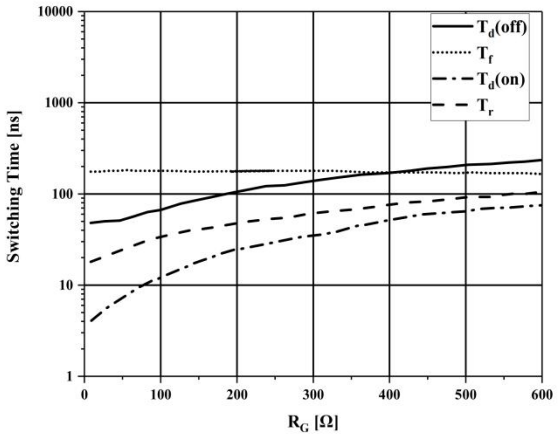


Fig.14 Switching Time vs. Junction Temperature
(V_{GE}=15V,V_{CE}=400V,I_C=6A,R_g=60Ω)

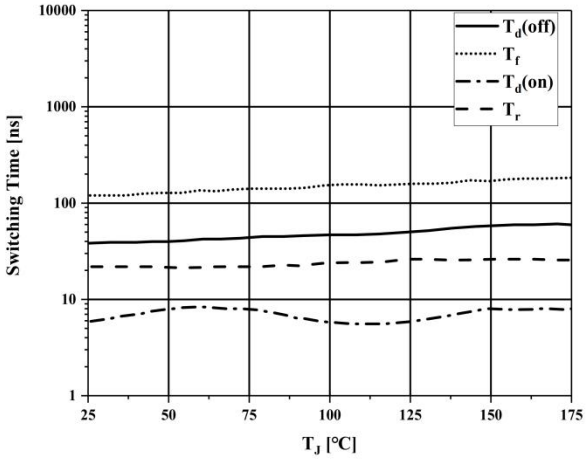


Fig.15 V_{GEth} vs. Junction Temperature

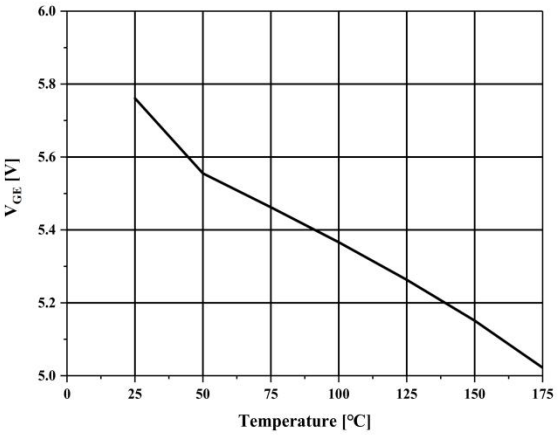


Fig.16 Switching Loss vs. I_C
(T_J=175℃,V_{GE}=15V,V_{CE}=400V,R_g=60Ω)

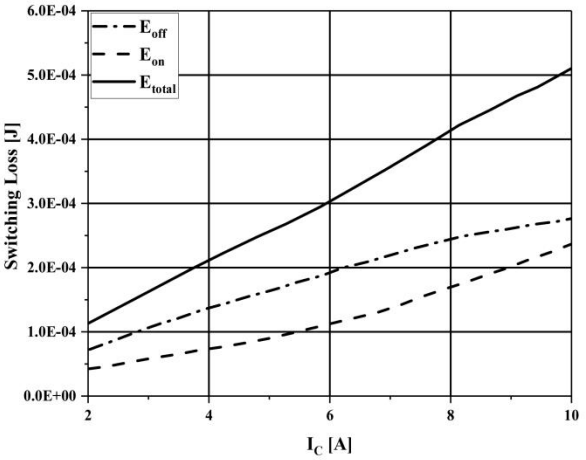


Fig.17 Switching Loss vs. R_g
(T_J=175℃,V_{GE}=15V,V_{CE}=400V,I_C=6A)

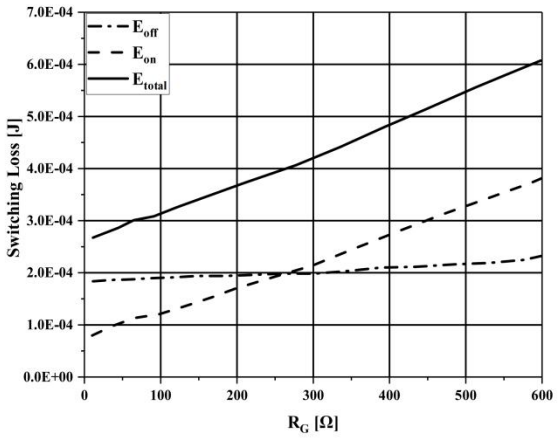
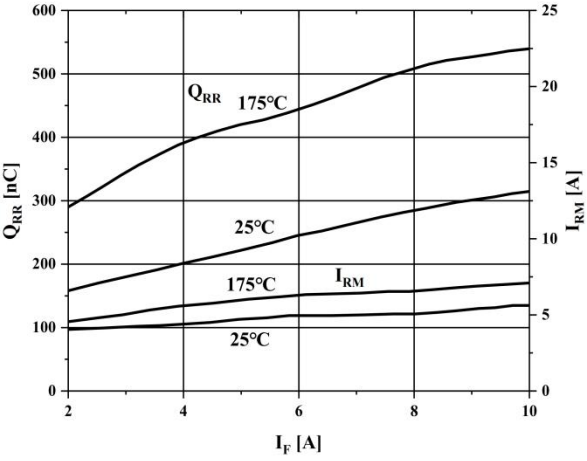
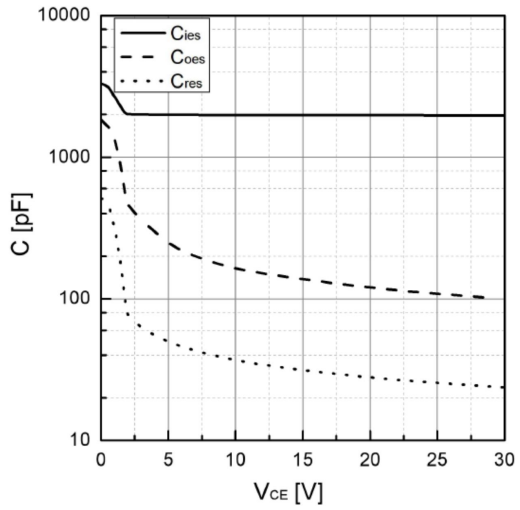


Fig.18 Diode Reverse Recovery Charge and Peak Current vs. Conduction Forward Current(V_{GE}=15V,V_{CE}=400V,di/dt=200A/us)



Typical Performance

Fig 13 Typical capacitance as a function of V_C(f=1Mhz, V_{GE}=0V)



Marking Information

Note:

COT: Company

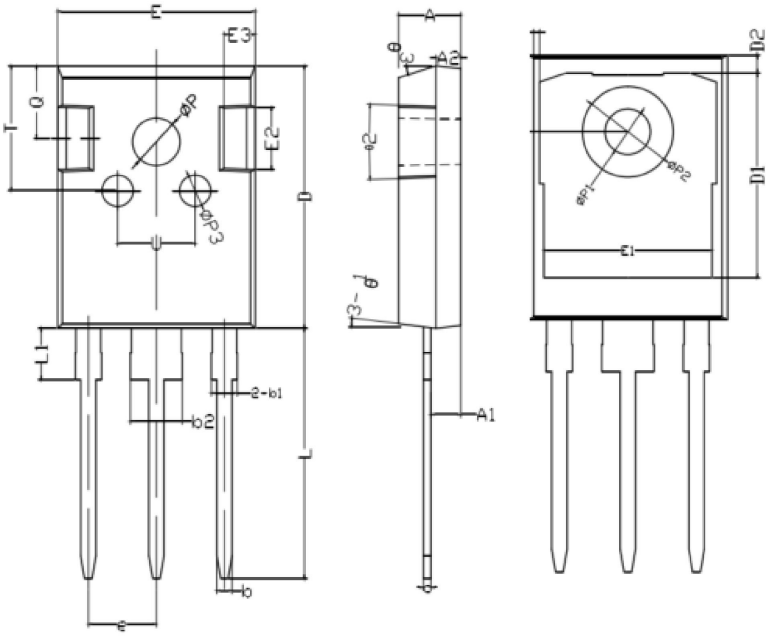
GB30N65: Product Type.

******: *: Inner Code * : Year Code **: Week Code **: Lot Code

Ordering Information

Part	Package	Marking	Packing method
CTGB30N65SHA	TO-247-3	30N65	Tube

Mechanical Dimensions for TO-247



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.59
A2	1.85	2.15
b	1.11	1.36
b1	1.91	2.25
b2	2.91	3.25
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.00	13.60
E2	4.80	5.20
E3	2.30	2.70
e	5.40	5.48
L	19.62	20.22
L1	-	4.30
ØP	3.40	3.80
ØP2	6.90	7.30
S	6.05	6.25