GOSTONE

RoHS COMPLIANT

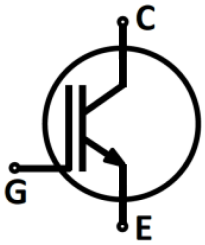
650V, 50A IGBT

GA50F06KK

Product Summary

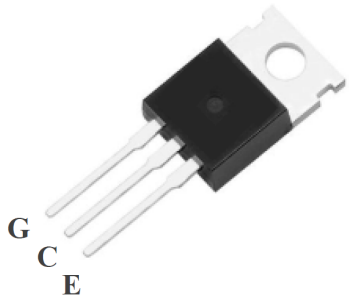
Parameter	Value
V_{CE}	650V
I_C(T_C=100℃)	50A
$V_{CE\ (sat)}$ (T_J=25℃)	1.8V

Equivalent circuit



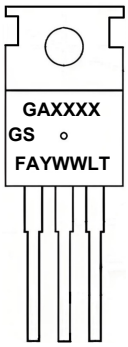
Features

- Trench and field-stop technology.
- Easy parallel switching capability.
- High efficiency for inverters.
- High ruggedness performance.
- RoHS compliant.



Application

- PFC applications
- Uninterruptible power supplies
- Solar inverters



TO-220C

NOTE:
LOGO - GS
GAXXXX - Part number code
F - Fab location code
A - Assembly location code
Y - Year code
WW - Week code
L&T - Assembly lot code

Absolute Maximum ratings Ta = 25°C

Symbol	Parameter	Values	Unit
V_{CES}	Collector-emitter voltage	650	V
V_{GES}	Gate-emitter voltage	±20	V
I_C	Continuous collector current (T_C=25℃)	100	A
	Continuous collector current (T_C=100℃)	50	A
I_{CM}	Pulsed collector current, t_p limited by T_{vjmax}	200	A
P_{tot}	Power dissipation (T_C=25℃)	535	W
	Power dissipation (T_C=100℃)	267	W
T_{vj}	Operating junction temperature range	-40 to +175	℃
T_{stg}	Storage temperature range	-55 to +150	℃

Thermal Characteristic

Symbol	Parameter	Values		Unit
		Typ.	Max.	
$R_{th(j-c)}$	Thermal resistance, junction to case for IGBT	-	0.28	K/ W
$R_{th(j-c)}$	Thermal resistance, junction to case for Diode	-	0.42	K/ W
$R_{th(j-a)}$	Thermal resistance, junction to ambient	-	40	K/ W

Electrical characteristics of IGBT (Tvj=25℃ unless otherwise specified)

Static characteristics

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
BV_{CES}	Collector-emitter breakdown voltage	V_{GE}=0V, I_C=250μA	650	-	-	V
I_{CES}	Collector-emitter leakage current	V_{CE}=650V, V_{GE}=0V	-	-	50	μA
I_{GES}	Gate leakage current, forward	V_{GE}=20V, V_{CE}=0V	-	-	100	nA
	Gate leakage current, reverse	V_{GE}=-20V, V_{CE}=0V	-	-	-100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	V_{GE}=V_{CE}, I_C=1mA	5.0	5.4	5.6	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_{GE}=15 V, I_C=60A	-	1.8	-	V
		V_{GE}=15V, I_C=60A, T_{vj}=175℃	-	2.3	-	V

Dynamic characteristics

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
C_{ies}	Input capacitance	V_{CE}=30V V_{GE}=0V f=1MHz	-	4820	-	pF
C_{oes}	Output capacitance		-	170	-	pF
C_{res}	Reverse transfer capacitance		-	34	-	pF
Q_g	Total gate charge	V_{CC}=520V V_{GE}=15V I_C=60A	-	154	-	nC

Switching characteristicsElectrical

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-on delay time	V_{CC}=400V V_{GE}=0/15V I_C=50A R_G=10Ω Inductive load	-	52	-	ns
t_r	Rise time		-	82	-	ns
$t_{d(off)}$	Turn-off delay time		-	193	-	ns
t_f	Fall time		-	61	-	ns
E_{on}	Turn-on energy		-	1.7	-	mJ
E_{off}	Turn-off energy		-	1.0	-	mJ
E_{ts}	Total switching energy		-	2.7	-	mJ
$t_{d(on)}$	Turn-on delay time	V_{CC}=400V V_{GE}=0/15V I_C=50A R_G=10Ω Inductive load T_{vj} =175℃	-	49	-	ns
t_r	Rise time		-	85	-	ns
$t_{d(off)}$	Turn-off delay time		-	210	-	ns
t_f	Fall time		-	68	-	ns
E_{on}	Turn-on energy		-	2.5	-	mJ
E_{off}	Turn-off energy		-	1.0	-	mJ
E_{ts}	Total switching energy		-	3.5	-	mJ

Typical performance characteristics

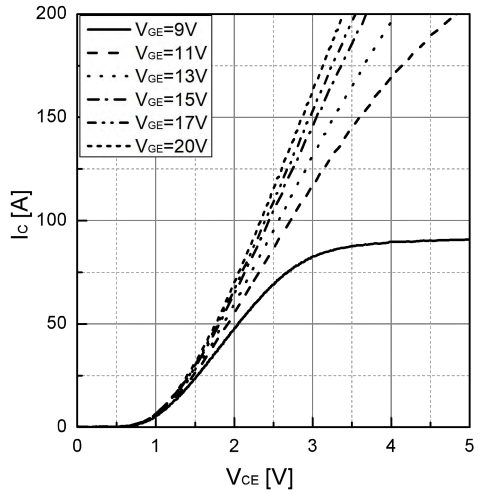


Fig 1. Typical output characteristic (T_{vj}=25℃)

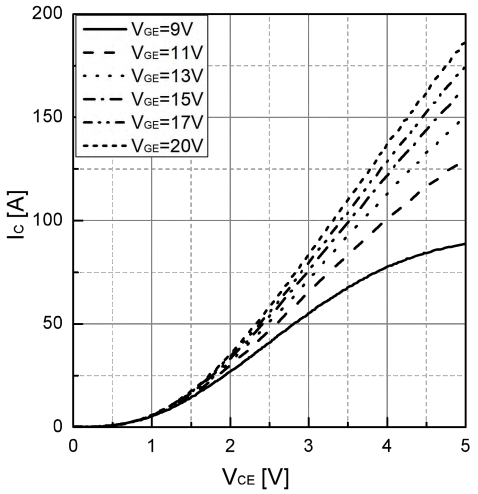


Fig 2. Typical output characteristic(T_{vj}=175℃)

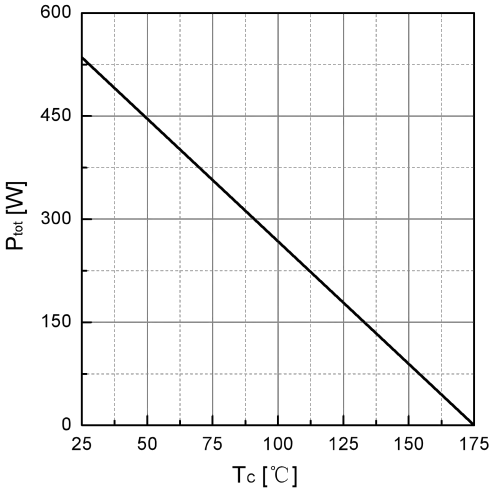


Fig 3. Power dissipation as a function of T_C

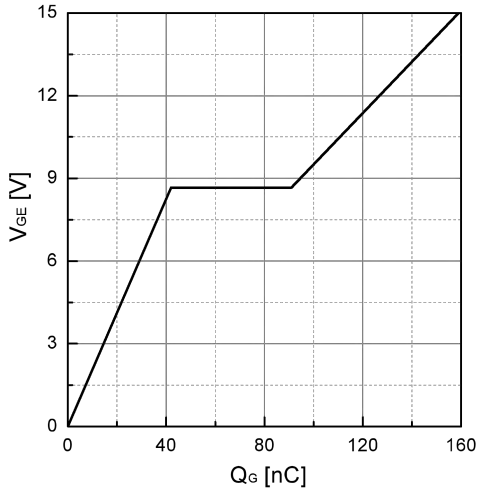


Fig 4. Typical Gate charge

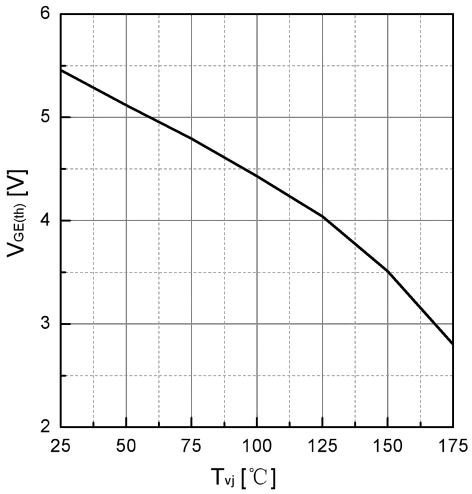


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj} (I_C=1mA)

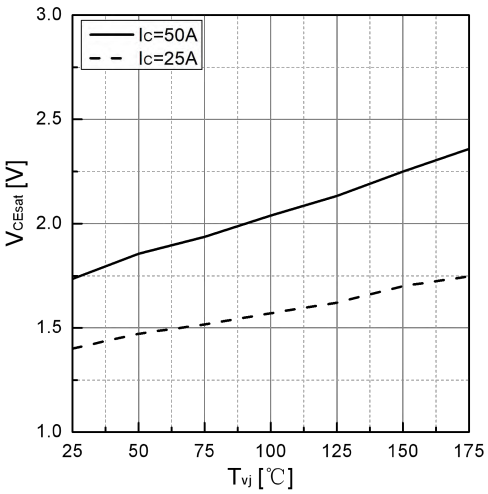


Fig 6. Typical V_{CEsat} as a function of T_{vj}

Typical performance characteristics

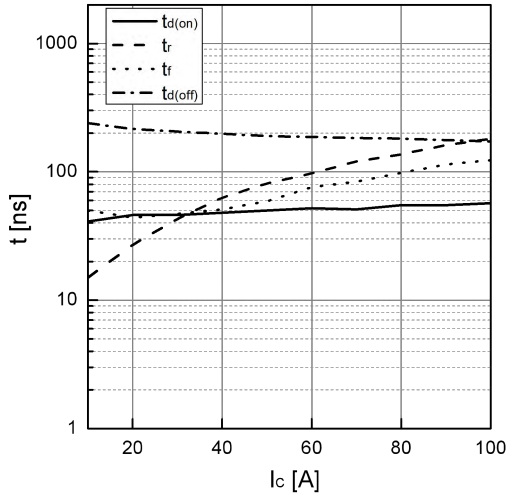


Fig 7. Typical switching time as a function of I_C

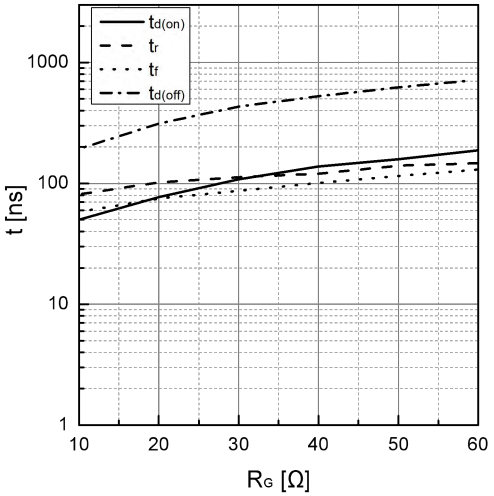


Fig 8. Typical switching times as a function of R_G

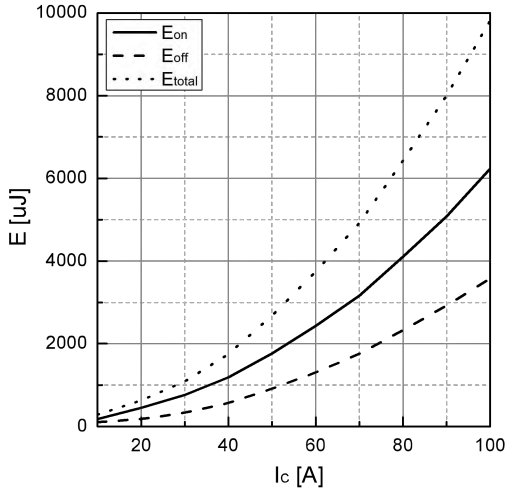


Fig 9. Typical switching energy losses as a function of I_C

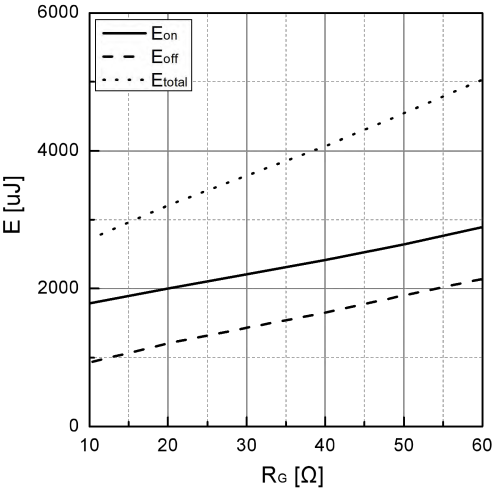


Fig 10. Typical switching energy losses as a function of R_G

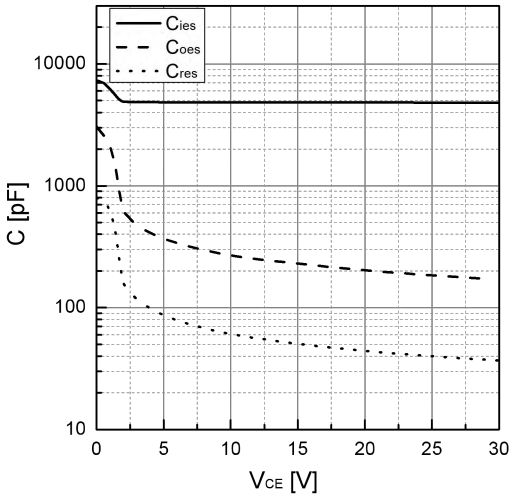


Fig 11. Typical capacitance as a function of V_{CE} (f=1Mhz, V_{GE}=0V)

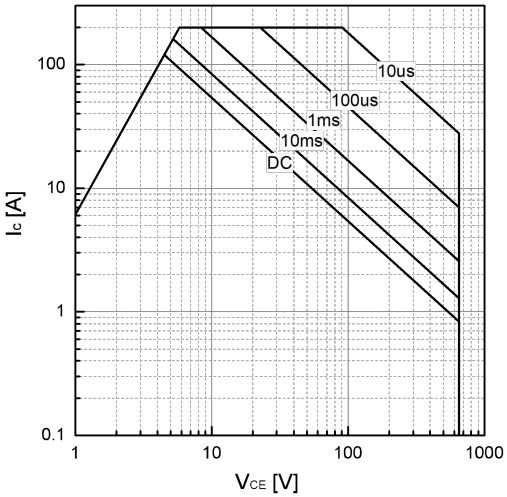


Fig 12. Safe operating area

Typical performance characteristics

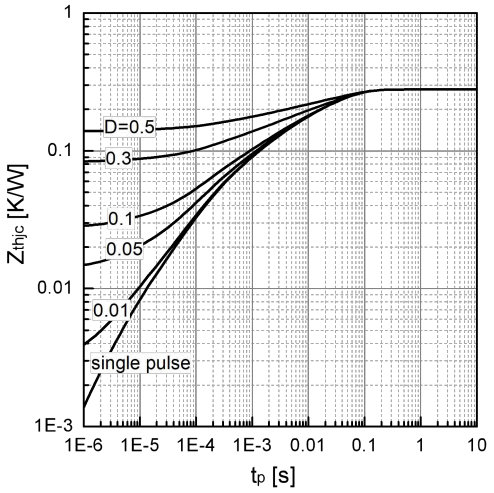
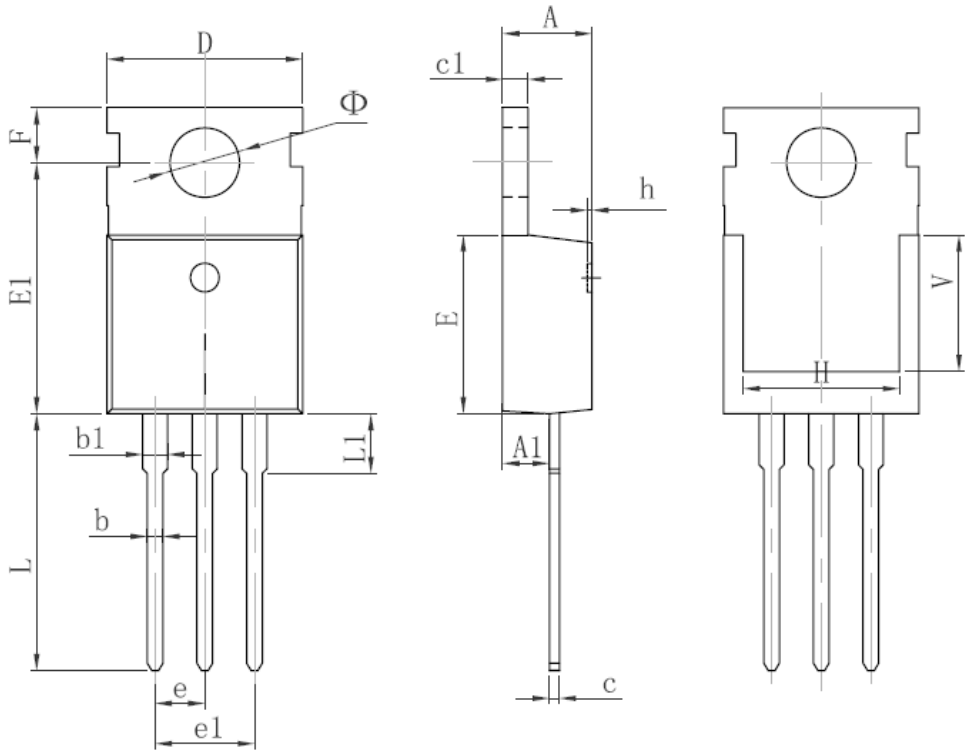


Fig 13. Transient thermal impedance of IGBT

Package Drawing TO-220C



Symbol	Dimensions In Millimeters		
	Min.	NOM.	Max.
A	4.40	-	4.60
A1	2.25	-	2.55
b	0.71	-	0.91
b1	1.17	-	1.37
c	0.33	-	0.65
c1	1.20	-	1.40
D	9.91	-	10.25
E	8.95	-	9.75
E1	12.65	-	13.05
e	2.54 TYP-		
e1	4.98	-	5.18
F	2.65	-	2.95
H	7.90	-	8.10
h	0.00	-	0.30
L	12.90	-	13.40
L1	2.85	-	3.25
V	6.90 REF		
ϕ	3.40	-	3.80

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