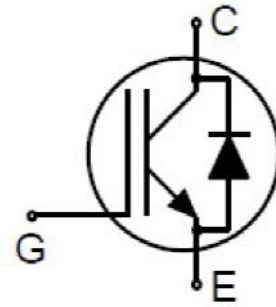


Features

- High breakdown voltage to 650V for improved reliability
- Trench-stop technology offering:
 - High speed switching
 - High ruggedness, temperature stable behavior
 - Short circuit withstand time: 10 μ s
 - Low $V_{CE(SAT)}$
 - Easy parallel switching capability due to positive temperature coefficient in $V_{CE(SAT)}$
- Enhanced avalanche capability
- RoHS compliant with Halogen-free

HF

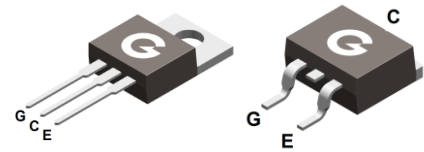


Applications

- Uninterruptible power supplies
- Solar inverter

Mechanical Data

- Case: TO-220AB, TO-263
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



TO-220AB

TO-263

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
GKP06N65	TO-220AB	50 pcs / Tube	KP06N65
GKB06N65	TO-263	50 pcs / Tube or 800 pcs / Tape & Reel	KB06N65

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

Parameter	Symbol	Value	Unit
Collector-to-Emitter Voltage	V_{CES}	650	V
Gate-Emitter Voltage	V_{GES}	± 20	V
DC Collector Current ($T_C = 25^\circ\text{C}$, limited by maximum T_J)	I_C	12	A
DC Collector Current ($T_C = 100^\circ\text{C}$, limited by maximum T_J)		6	A
Diode Continuous Forward Current ($T_C = 25^\circ\text{C}$, limited by maximum T_J)	I_F	12	A
Diode Continuous Forward Current ($T_C = 100^\circ\text{C}$, limited by maximum T_J)		6	A
Pulsed Collector Current (Pulse width limited by maximum T_J , $V_{GE} = 15\text{V}$)	I_{CM}	18	A
Short Circuit Withstand Time ($V_{GE} = 15\text{V}$, $V_{CE} \leq 400\text{V}$)	T_{SC}	10	μs
Soldering Temperature, Wave Soldering 1.6mm (0.063in.) from Case for 10s	T_{sold}	260	$^\circ\text{C}$
Power Dissipation ($T_C = 25^\circ\text{C}$, TO-220AB, TO-263)	P_D	60	W
Operating Junction Temperature Range	T_J	-55 ~ +175	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 ~ +150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case, IGBT, TO-220AB,TO-263	R _{θJC}	-	-	2.5	°C/W
Thermal Resistance Junction-to-Case, Diode, TO-220AB,TO-263		-	-	4.6	°C/W
Thermal Resistance Junction-to-Air, TO-220AB,TO-263	R _{θJA}	-	-	62.5	°C/W

Electrical Characteristics of the IGBT (@ T_J = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{(BR)CES}	Collector-Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 250μA	650	-	-	V
		V _{GE} = 0V, I _C = 1mA	650	-	-	V
I _{CES}	Collector-Emitter Leakage Current	V _{CE} = 650V, V _{GE} = 0V	-	-	10	μA
I _{GES}	Gate to Emitter Leakage Current	V _{GE} = ±20V, V _{CE} = 0V	-	-	±200	nA
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 6A	-	1.59	2.05	V
V _{GE(th)}	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C = 250μA	4	5.5	6.5	V
R _G	Gate Resistance	V _{GE} = 0V, f = 1MHz	-	4.6	-	Ω
Dynamic Characteristics						
Q _G	Total Gate-Charge	V _{CC} = 400V, V _{GE} = 15V, I _C = 6A	-	18.2	-	nC
C _{ies}	Input Capacitance	V _{CE} = 25V V _{GE} = 0V f = 1MHz	-	355	-	pF
C _{oes}	Output Capacitance					
C _{res}	Reverse Transfer Capacitance					
I _{C(SC)}	Short Circuit Collector Current	V _{GE} = 15V, t _{SC} ≤ 10μs V _{CC} = 400V, T _J = 25°C	-	30	-	A
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{CE} = 400V V _{GE} = 15V I _C = 6A R _G = 60Ω T _J = 25°C	-	53	-	ns
t _r	Turn-on Rise Time					
t _{d(off)}	Turn-Off Delay Time					
t _f	Turn-Off Fall Time					
E _{on}	Turn-On Switching Loss	T _J = 25°C	-	0.403	-	mJ
E _{off}	Turn-Off Switching Loss		-	0.091	-	

Electrical Characteristics of the Diode (@ T_J = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Dynamic Characteristics						
V _{FM}	Diode Forward Voltage	I _F = 6A, V _{GE} = 0V	-	1.8	2.2	V
t _{rr}	Reverse recovery time	V _{GE} = 0V, I _F = 6A di/dt = 200A/μs	-	41	-	ns
Q _{rr}	Reverse recovery charge		-	80	-	nC
I _{rrm}	Peak Reverse Recovery Current		-	3.77	-	A

Ratings and Characteristics Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

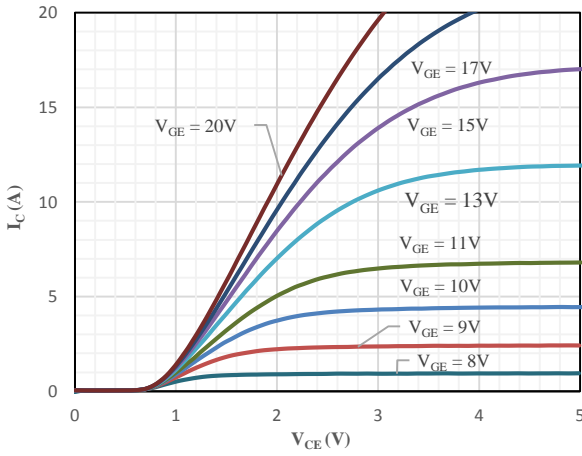


Fig 1 Typical Output Characteristics

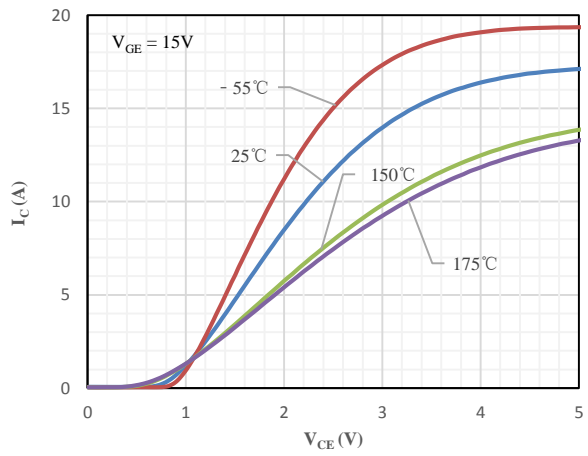


Fig 2 Saturation Voltage Characteristics

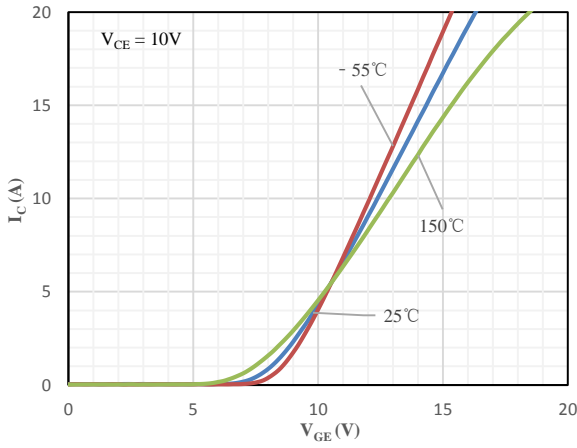


Fig 3 Transfer Characteristics

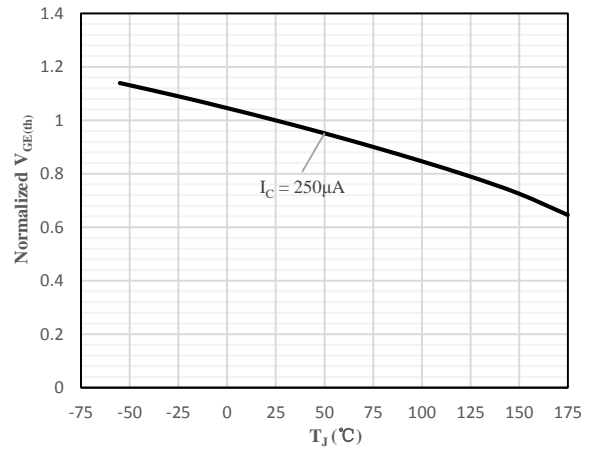


Fig 4 Normalized $V_{GE(th)}$ vs. Junction Temperature

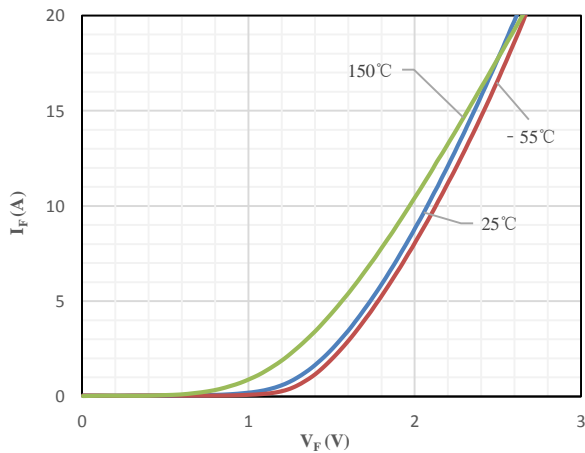


Fig 5 Body-Diode Characteristics

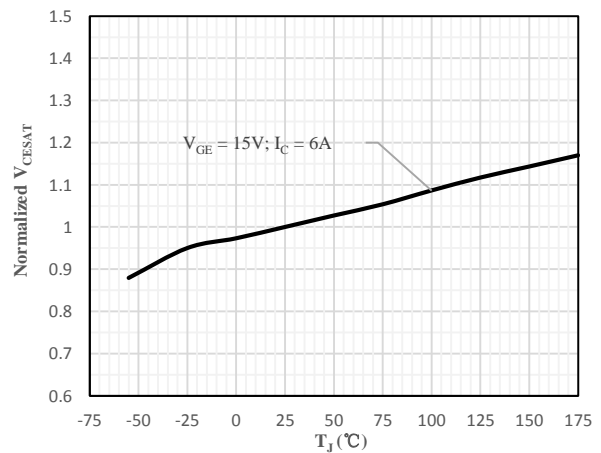


Fig 6 Normalized Collector-Emitter Saturation Voltage vs. Junction Temperature

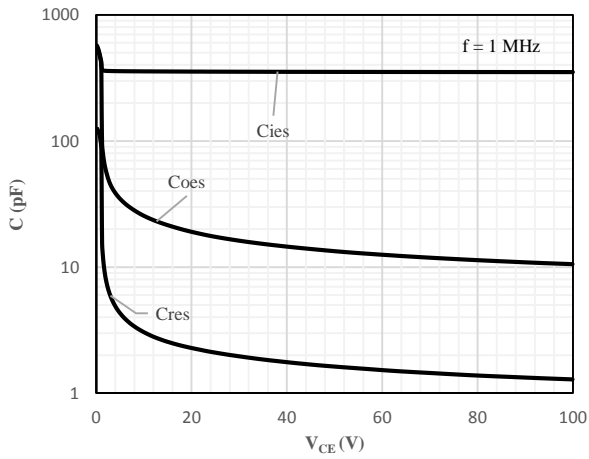


Fig 7 Capacitance Characteristics

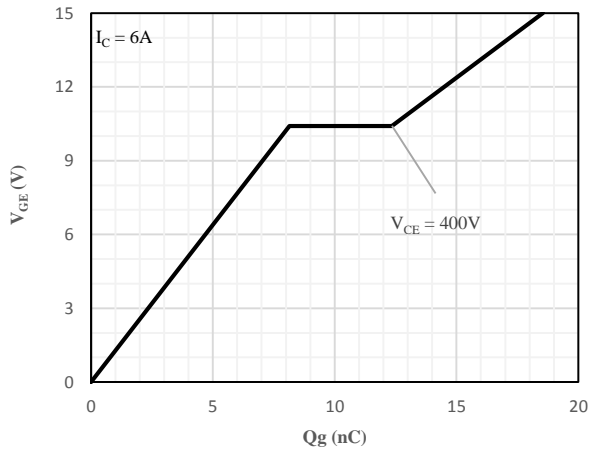


Fig 8 Gate-Charge Characteristics

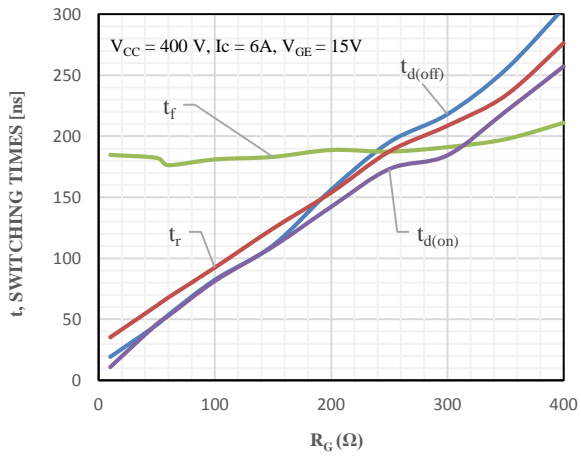


Fig 9 Switching Times vs. Gate Resistor

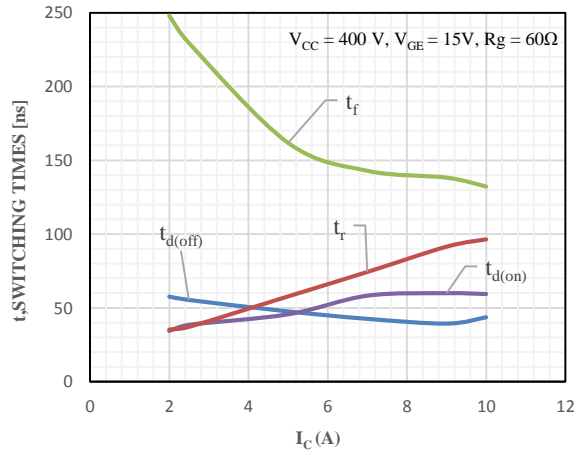


Fig 10 Switching Times vs. Collector Current

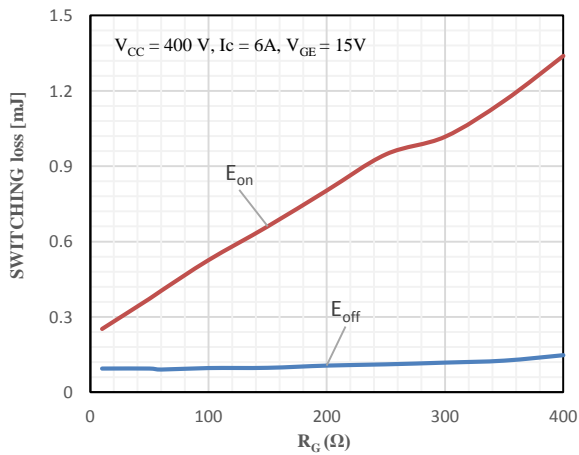


Fig 11 Switching Loss vs. Gate Resistor

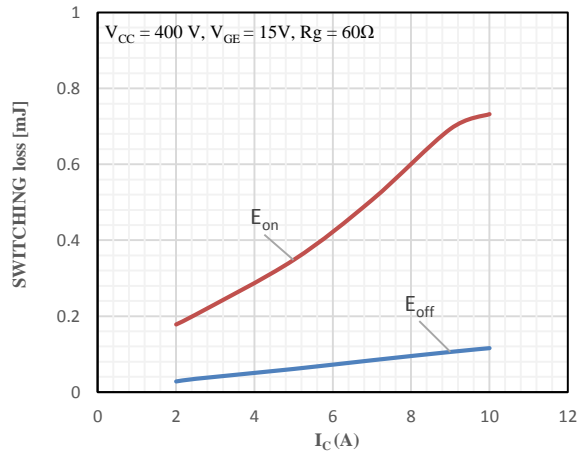


Fig 12 Switching Loss vs. Collector Current

Package Outline Dimensions (Unit: mm)

