PD - 94545C

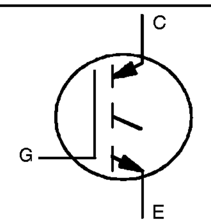
International
IOR Rectifier

IRGB8B60K
IRGS8B60K
IRGSL8B60K

INSULATED GATE BIPOLAR TRANSISTOR

Features

- Low VCE (on) Non Punch Through IGBT Technology.
- 10µs Short Circuit Capability.
- Square RBSOA.
- Positive VCE (on) Temperature Coefficient.



n-channel

V_{CES} = 600V

I_C = 20A, T_C=100°C

t_{sc}>10µs, T_J=150°C

$V_{CE(on)}$ typ. = 1.8V

Benefits

- Benchmark Efficiency for Motor Control.
- Rugged Transient Performance.
- Low EMI.
- Excellent Current Sharing in Parallel Operation.

TO-220AB	D^2Pak	TO-262
IRGB8B60K	IRGS8B60K	IRGSL8B60K

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	600	V
I_C @ T_C = 25°C	Continuous Collector Current	28	A
I_C @ T_C = 100°C	Continuous Collector Current	19	
I_{CM}	Pulse Collector Current (Ref.Fig.C.T.5)	56	
I_{LM}	Clamped Inductive Load current ①	56	
V_{GE}	Gate-to-Emitter Voltage	±20	V
P_D @ T_C = 25°C	Maximum Power Dissipation	167	W
P_D @ T_C = 100°C	Maximum Power Dissipation	83	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +175	°C
	Storage Temperature Range, for 10 sec.	300 (0.063 in. (1.6mm) from case)	

Thermal / Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case- IGBT	–––	–––	0.90	°C/W
$R_{\theta CS}$	Case-to-Sink, flat, greased surface	–––	0.50	–––	
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount ②	–––	–––	62	
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount, Steady State)③	–––	–––	40	
	Weight	–––	1.44	–––	g

10/16/03

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

	Parameter	Min.	Typ.	Max.	Units	Conditions	Ref.Fig.
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	600	—	—	V	V_{GE} = 0V, I_C = 500μA	
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	0.57	—	V/°C	V_{GE} = 0V, I_C = 1mA (25°C-150°C)	
$V_{CE(on)}$	Collector-to-Emitter Voltage	—	1.8	2.2	V	I_C = 8.0A, V_{GE} = 15V, T_J = 25°C	5,6,7
		—	2.2	2.5		I_C = 8.0A, V_{GE} = 15V, T_J = 150°C	8,9,10
		—	2.3	2.6		I_C = 8.0A, V_{GE} = 15V, T_J = 175°C	
$V_{GE(th)}$	Gate Threshold Voltage	3.5	4.5	5.5		V_{CE} = V_{GE}, I_C = 250μA	8,9,10,
$\Delta V_{GE(th)}/\Delta T_J$	Threshold Voltage temp. coefficient	—	-9.5	—	mV/°C	V_{CE} = V_{GE}, I_C = 1mA (25°C-125°C)	11
gfe	Forward Transconductance	—	3.7	—	S	V_{CE} = 50V, I_C = 8.0A, PW = 80μs	
I_{CES}	Zero Gate Voltage Collector Current	—	1.0	150	μA	V_{GE} = 0V, V_{CE} = 600V	
		—	200	500		V_{GE} = 0V, V_{CE} = 600V, T_J = 150°C	
		—	800	1320		V_{GE} = 0V, V_{CE} = 600V, T_J = 175°C	
I_{GES}	Gate-to-Emitter Leakage Current	—	—	±100	nA	V_{GE} = ±20V	

Switching Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions	Ref.Fig.
Q_g	Total Gate Charge (turn-on)	—	29	—	nC	I_C = 8.0A	17
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	3.7	—		V_{CC} = 480V	CT1
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	14	—		V_{GE} = 15V	
E_{on}	Turn-On Switching Loss	—	160	268	μJ	I_C = 8.0A, V_{CC} = 400V	CT4
E_{off}	Turn-Off Switching Loss	—	160	268		V_{GE} = 15V, R_G = 50Ω, L = 1.1mH	
E_{tot}	Total Switching Loss	—	320	433		T_J = 25°C ④	
$t_{d(on)}$	Turn-On delay time	—	23	27	ns	I_C = 8.0A, V_{CC} = 400V	
t_r	Rise time	—	22	26		V_{GE} = 15V, R_G = 50Ω, L = 1.1mH	CT4
$t_{d(off)}$	Turn-Off delay time	—	140	150		T_J = 25°C	
t_f	Fall time	—	32	42			
E_{on}	Turn-On Switching Loss	—	220	330	μJ	I_C = 8.0A, V_{CC} = 400V	CT4
E_{off}	Turn-Off Switching Loss	—	270	381		V_{GE} = 15V, R_G = 50Ω, L = 1.1mH	12,14
E_{tot}	Total Switching Loss	—	490	608		T_J = 150°C ④	WF1,WF2
$t_{d(on)}$	Turn-On delay time	—	22	27	ns	I_C = 8.0A, V_{CC} = 400V	13,15
t_r	Rise time	—	21	25		V_{GE} = 15V, R_G = 50Ω, L = 1.1mH	CT4
$t_{d(off)}$	Turn-Off delay time	—	180	198		T_J = 150°C	WF1
t_f	Fall time	—	40	56			WF2
C_{ies}	Input Capacitance	—	440	—	pF	V_{GE} = 0V	
C_{oes}	Output Capacitance	—	38	—		V_{CC} = 30V	16
C_{res}	Reverse Transfer Capacitance	—	16	—		f = 1.0MHz	
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T_J = 150°C, I_C = 34A, Vp = 600V V_{CC}=500V,V_{GE} = +15V to 0V,R_G = 50Ω	4 CT2
SCSOA	Short Circuit Safe Operating Area	10	—	—	μs	T_J = 150°C, Vp = 600V, R_G = 100Ω V_{CC}=360V,V_{GE} = +15V to 0V	CT3 WF3

Notes ① to ④ are on page 13.

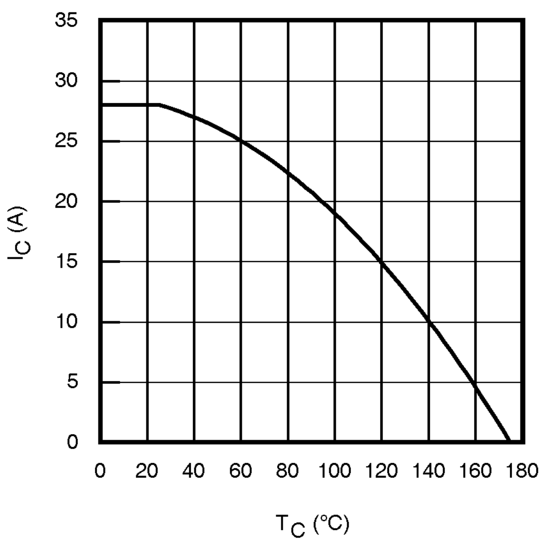


Fig. 1 - Maximum DC Collector Current vs. Case Temperature

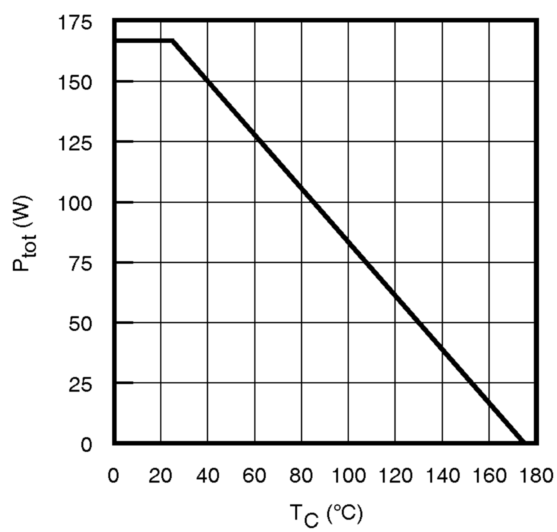


Fig. 2 - Power Dissipation vs. Case Temperature

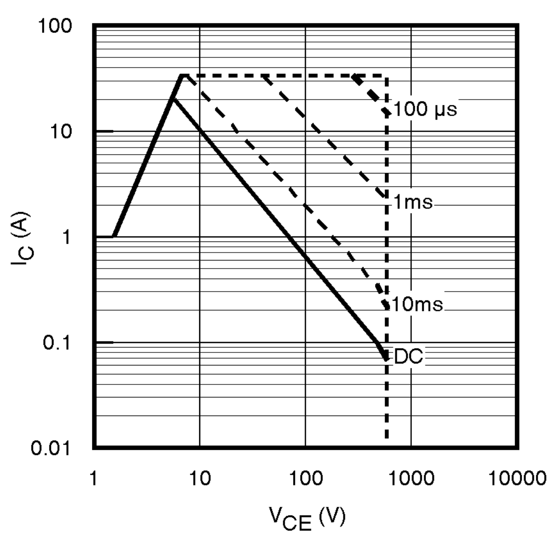


Fig. 3 - Forward SOA
T_C = 25°C; $T_J \leq$ 150°C

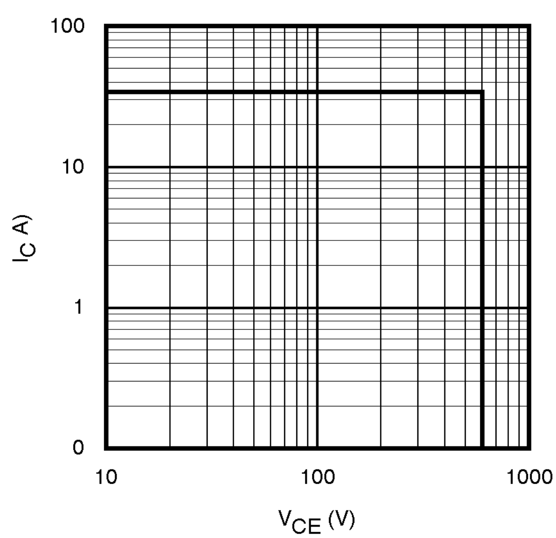


Fig. 4 - Reverse Bias SOA
T_J = 150°C; V_{GE} =15V

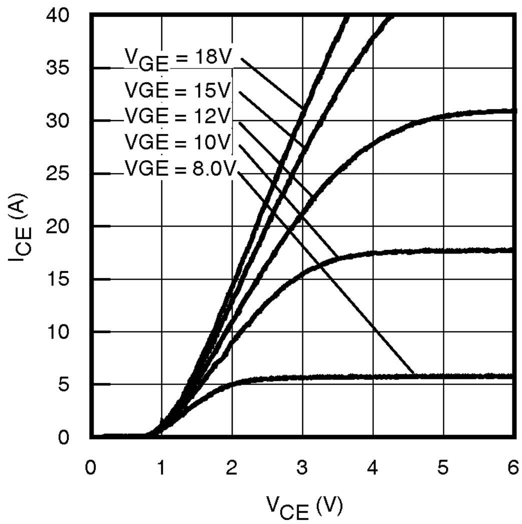


Fig. 5 - Typ. IGBT Output Characteristics
T_J = -40°C; tp = 80µs

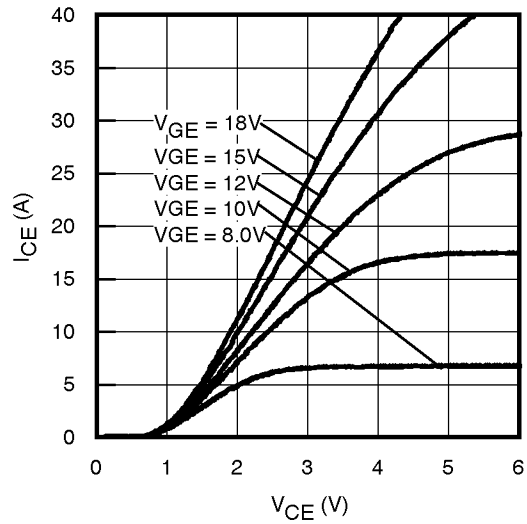


Fig. 6 - Typ. IGBT Output Characteristics
T_J = 25°C; tp = 80µs

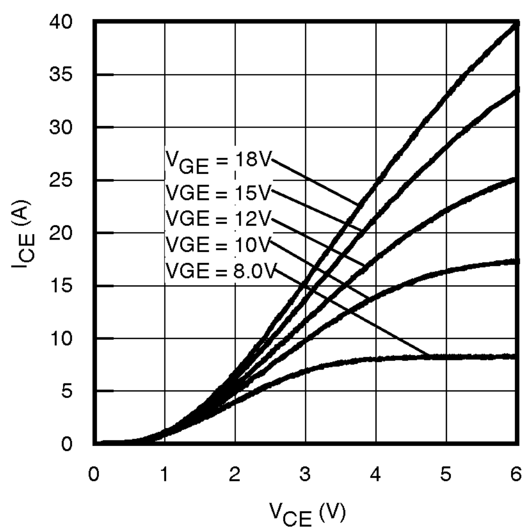


Fig. 7 - Typ. IGBT Output Characteristics
T_J = 150°C; tp = 80µs

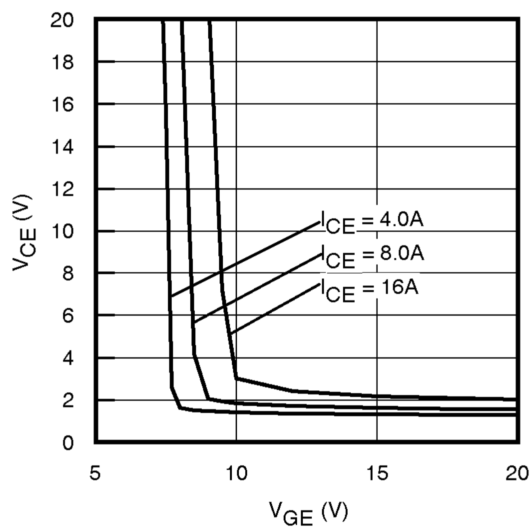


Fig. 8 - Typical V_{CE} vs. V_{GE}
T_J = -40°C

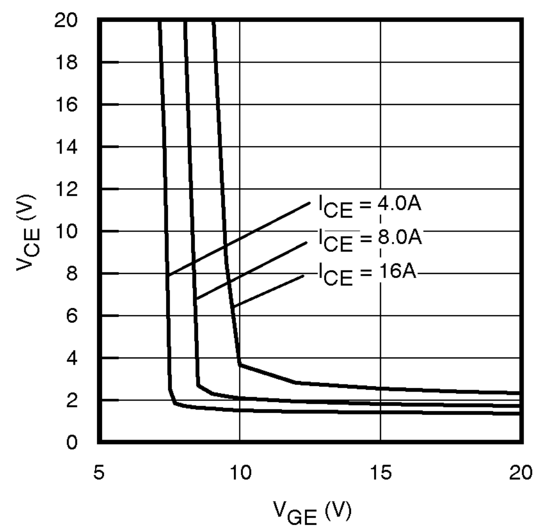


Fig. 9 - Typical V_{CE} vs. V_{GE}
T_J = 25°C

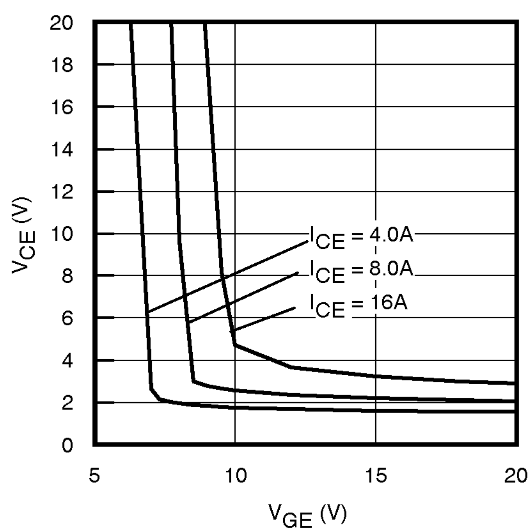


Fig. 10 - Typical V_{CE} vs. V_{GE}
T_J = 150°C

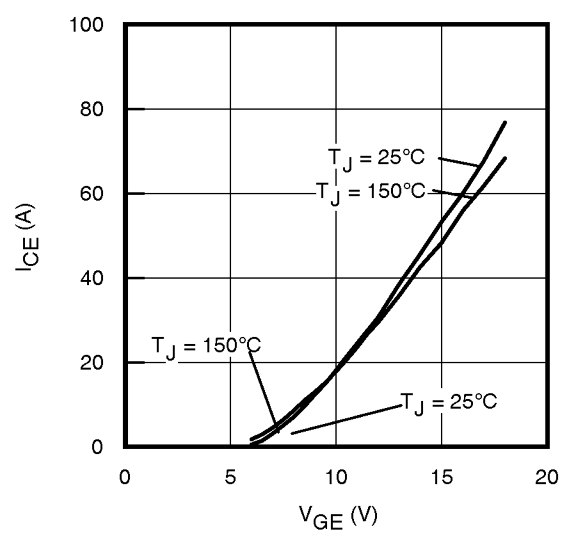


Fig. 11 - Typ. Transfer Characteristics
V_{CE} = 360V; tp = 10µs