



IGBT Discrete

V_{CE}	650	V
I_C	60	A
$V_{CE(SAT)}$ $I_C=60A$	2.10	V

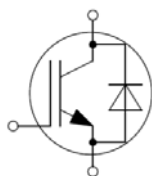
Applications

- High frequency switching application
- Medical applications
- Uninterruptible power supply
- Motion/servo control

Features

- Low switching losses
- Maximum junction temperature 175°C
- Positive temperature coefficient
- High ruggedness, temperature stable
- High short circuit capability(5us)

Circuit



Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC Collector Current, limited by T_{jmax} $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	I_C	120 60	A
Diode Forward Current, limited by T_{jmax} $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	I_F	60 30	A
Continuous Gate-Emitter Voltage	V_{GE}	± 20	V
Transient Gate-Emitter Voltage	V_{GE}	± 30	V
Turn off Safe Operating Area $V_{CE} \leq 1200V$, $T_j \leq 150^{\circ}C$		240	A
Pulsed Collector Current, $V_{GE}=15V$, t_p limited by T_{jmax}	I_{CM}	240	A
Diode Pulsed Current, t_p limited by T_{jmax}	I_{Fpuls}	120	A
Short Circuit Withstand Time, $V_{GE}=15V$, $V_{CC}=400V$, $V_{CEM} \leq 650V$	T_{sc}	5	μs
Power Dissipation, $T_j=175^{\circ}C$, $T_C=25^{\circ}C$	P_{tot}	395	W
Operating Junction Temperature	T_j	-40...+175	$^{\circ}C$
Storage Temperature	T_s	-55...+150	$^{\circ}C$
Soldering Temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	$^{\circ}C$



■ **Electrical Characteristics of the IGBT** ($T_j = 25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	650		-	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.0mA$	4.5	5.0	5.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=60A$ $T_j=25^\circ C,$ $T_j=125^\circ C,$ $T_j=150^\circ C$		2.10 2.40 2.50	2.40	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$ $T_j=25^\circ C,$ $T_j=150^\circ C$			0.25 4.00	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$			100	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz$	-	2.24	-	nF
Reverse Transfer Capacitance	C_{res}		-	0.90	-	
Gate Charge	Q_G	$V_{CC}=300V, I_C=60A, V_{GE}=15V$	-	0.24	-	μC
Short Circuit Collector Current	I_{SC}	$V_{GE}=15V, t_{sc}\leq 5\mu s,$ $V_{CC}=400V, T_j\leq 150^\circ C$	-	280	-	A

**■Electrical Characteristics of the Diode** ($T_J = 25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Diode Forward Voltage	V_F	$I_F = 60\text{A}$ $T_J = 25^\circ\text{C}$, $T_J = 125^\circ\text{C}$ $T_J = 150^\circ\text{C}$		2.00 1.95 1.95	2.50	V

■Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T _J = 25°C						
Turn-on Delay Time	t _d (on)	V _{CC} =300V, I _C =60A, V _{GE} = -15v~15V, Rg=20Ω,Ls=60nH	-	32	-	ns
Rise Time	t _r		-	75	-	ns
Turn-on Energy	E _{on}		-	1.90	-	mJ
Turn-off Delay Time	t _d (off)		-	122	-	ns
Fall Time	t _f		-	49	-	ns
Turn-off Energy	E _{off}		-	0.74	-	mJ
Dynamic , at T _J = 125°C						
Turn-on Delay Time	t _d (on)	V _{CC} =300V, I _C =60A,, V _{GE} = -15v~15V, Rg=20Ω,Ls=60nH	-	43	-	ns
Rise Time	t _r		-	85	-	ns
Turn-on Energy	E _{on}		-	2.93	-	mJ
Turn-off Delay Time	t _d (off)		-	235	-	ns
Fall Time	t _f		-	62	-	ns
Turn-off Energy	E _{off}		-	1.18	-	mJ
Dynamic , at T _J = 150°C						
Turn-on Delay Time	t _d (on)	V _{CC} =300V, I _C =60A,, V _{GE} = -15v~15V, Rg=20Ω,Ls=60nH	-	46	-	ns
Rise Time	t _r		-	89	-	ns
Turn-on Energy	E _{on}		-	3.18	-	mJ
Turn-off Delay Time	t _d (off)		-	248	-	ns
Fall Time	t _f		-	65	-	ns
Turn-off Energy	E _{off}		-	1.36	-	mJ

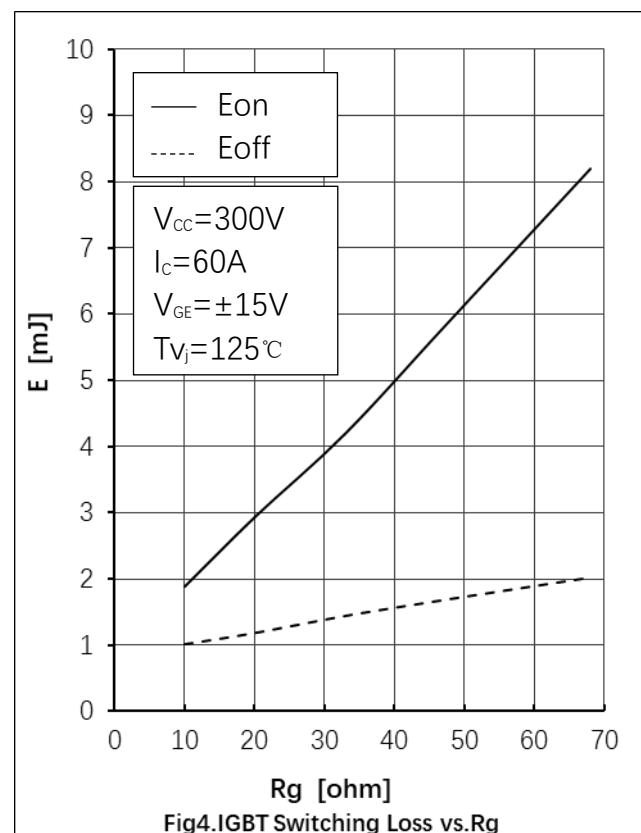
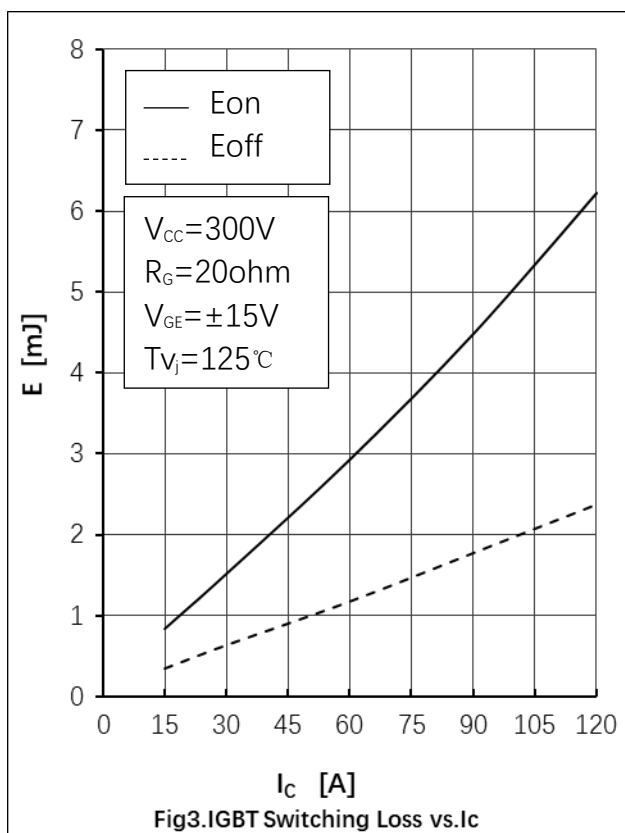
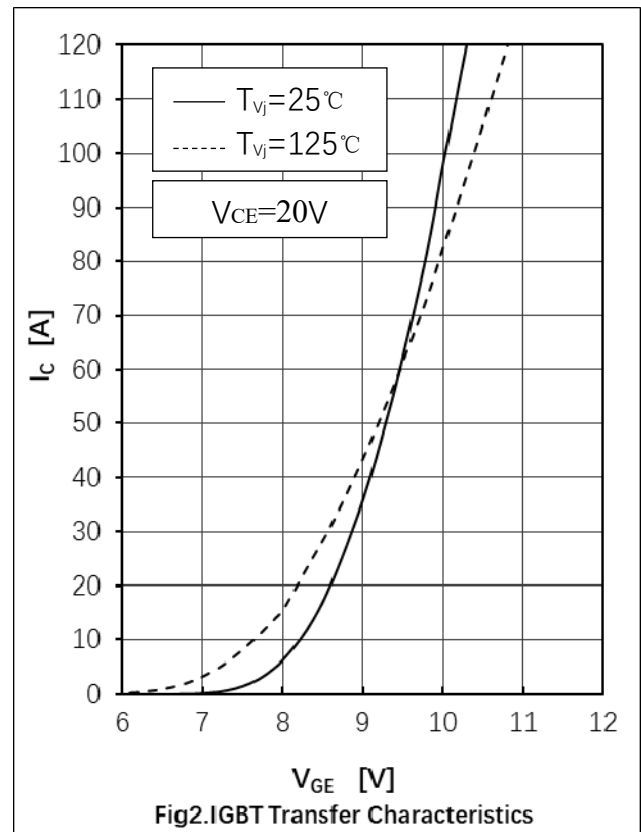
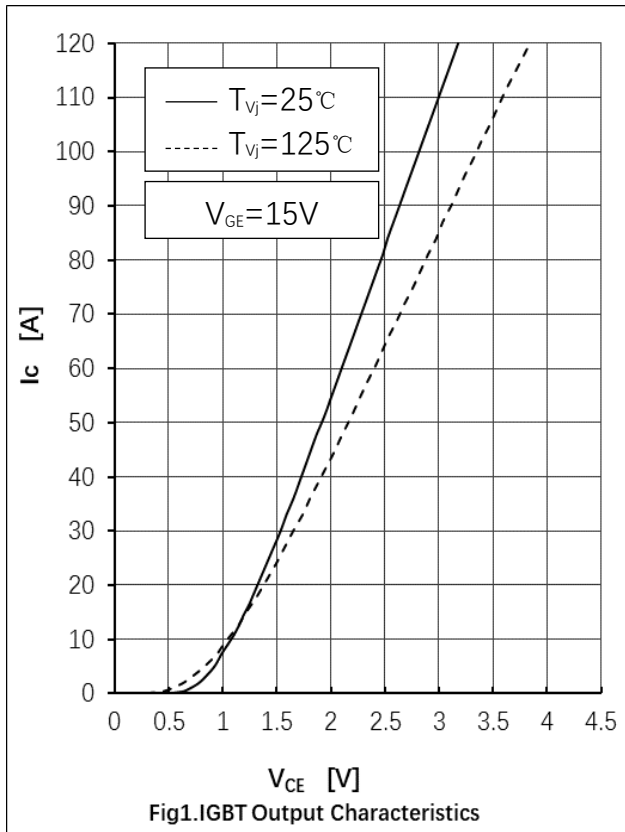


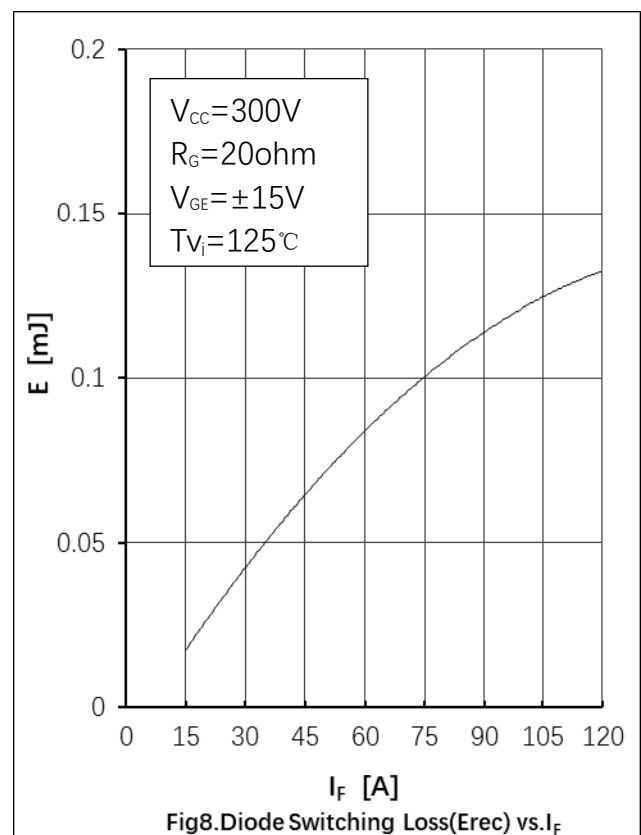
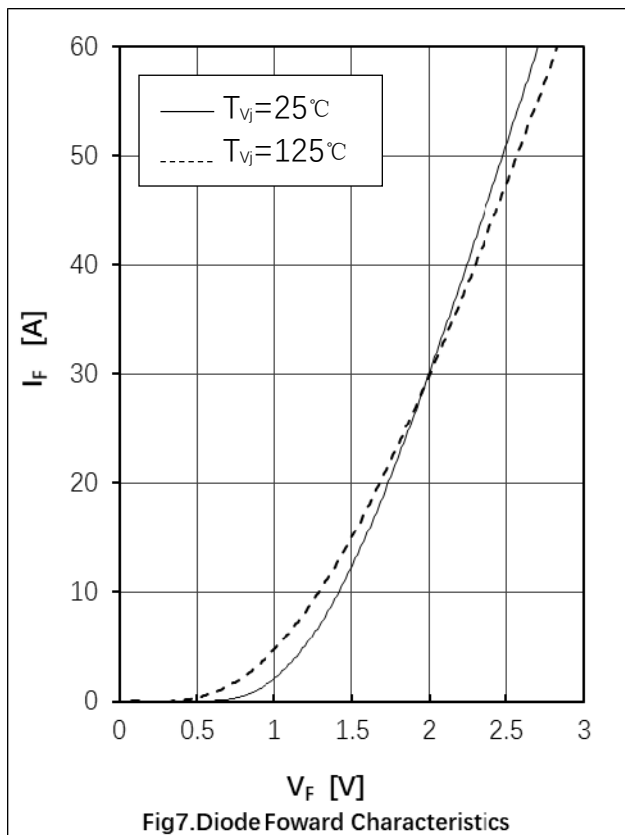
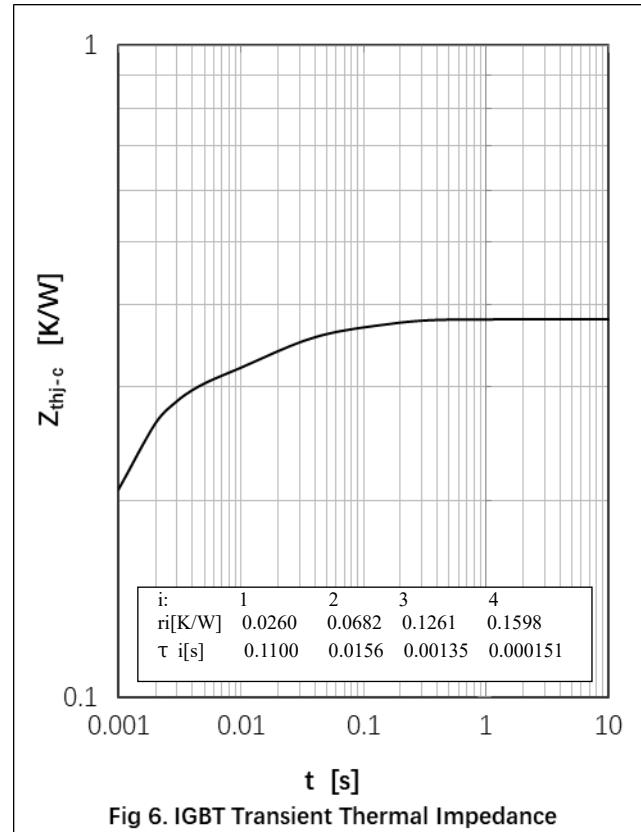
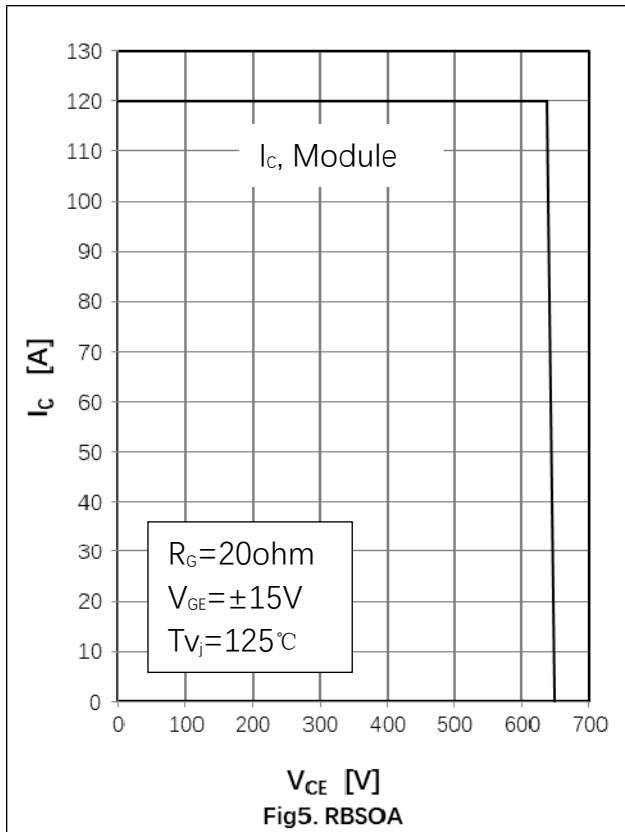
■Electrical Characteristics of the Diode

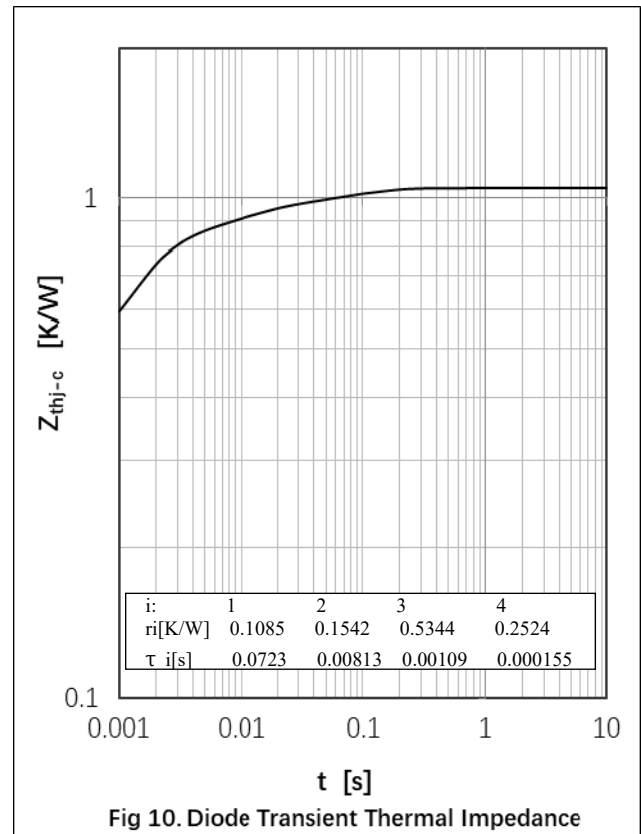
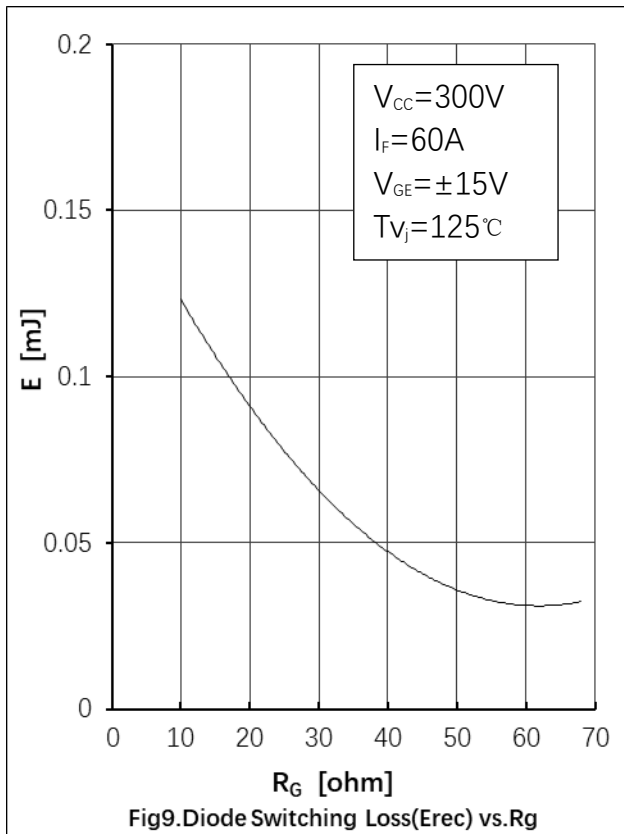
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T _j = 25°C						
Reverse Recovery Current	I _{rr}	I _F =60A, V _R =300V di/dt= -366A/μs,	-	5.0	-	A
Reverse Recovery Charge	Q _{rr}		-	0.12	-	uC
Diode reverse recovery time	t _{rr}		-	45	-	ns
Reverse Recovery Energy	E _{rec}		-	0.04		mJ
Dynamic , at T _j = 125°C						
Reverse Recovery Current	I _{rr}	I _F =60A, V _R =300V di/dt= -366A/μs,	-	7.2	-	A
Reverse Recovery Charge	Q _{rr}		-	0.25	-	uC
Diode reverse recovery time	t _{rr}		-	80	-	ns
Reverse Recovery Energy	E _{rec}		-	0.08		mJ
Dynamic , at T _j = 150°C						
Reverse Recovery Current	I _{rr}	I _F =60A, V _R =300V di/dt= -366A/μs,	-	8.4	-	A
Reverse Recovery Charge	Q _{rr}		-	0.29	-	uC
Diode reverse recovery time	t _{rr}		-	90	-	ns
Reverse Recovery Energy	E _{rec}		-	0.09		mJ

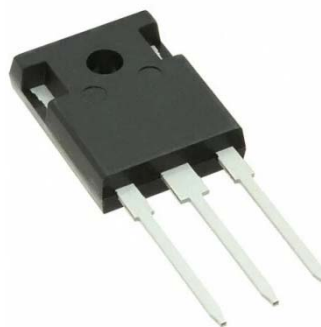
■Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R _{th(j-c)}	0.38	K/W
Diode Thermal Resistance, Junction - Case	R _{th(j-c)}	1.05	K/W
Thermal Resistance, Junction - Ambient	R _{th(j-a)}	40	K/W









CASE: TO 247

