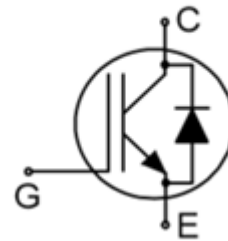


Trench Field-Stop Technology IGBT

Features

- 650V, 75A
- $V_{CE(sat)(typ.)} = 1.8V @ V_{GE} = 15V, I_C = 75A$
- Low Switching Losses
- Low switching surge and noise
- Low EMI



Applications

- Solar Converters
- Uninterrupted Power Supply
- Energy Storage
- Welding machine
- EV Charger

Order codes	V_{CE}	I_C	$V_{CEsat}, T_{vj}=25^{\circ}C$	T_{vjmax}	Marking	Package
XD075H065A1S3-B	650V	75A	1.8V	175°C	D75H065A1B	TO247-3

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current ($T_C=25^{\circ}C$)	115	A
	Continuous Collector Current ($T_C=100^{\circ}C$)	75	A
I_{CM}	Pulsed Collector Current (Note 1)	300	A
I_F	Diode Continuous Forward Current ($T_C=25^{\circ}C$)	115	A
	Diode Continuous Forward Current ($T_C=100^{\circ}C$)	75	A
P_D	Maximum Power Dissipation (IGBT)	420	W
	Maximum Power Dissipation (FWD)	375	W
T_J	Operating Junction Temperature Range	-40 to 175	°C
T_{STG}	Storage Temperature Range	-55 to 175	°C

Thermal Data

Symbol	Parameter	Max.	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	50	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	0.35	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case for Diodes	0.8	°C/W

Electrical Characteristics ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=500\mu A$	650	---	---	V
I_{CES}	Collector-Emitter Leakage Current	$V_{CE}=650V, V_{GE}=0V$	---	---	200	μA
I_{GES}	Gate Leakage Current, Forward	$V_{GE}=20V, V_{CE}=0V$	---	---	200	nA
	Gate Leakage Current, Reverse	$V_{GE}=-20V, V_{CE}=0V$	---	---	-200	nA
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE}=V_{CE}, I_C=250\mu A$	5.0	5.8	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=20V, I_C=75A$	---	1.8	2.1	V
Q_G	Total Gate Charge	$V_{CC}=520V, V_{GE}=15V$ $I_C=75A$	---	330	---	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=400V$ $V_{GE}=\pm 15V$ $I_C=75A$ $R_G=10\Omega$ Inductive Load $T_C=25^\circ\text{C}$	---	80	---	ns
t_r	Turn-on Rise Time		---	33	---	ns
$t_{d(off)}$	Turn-off Delay Time		---	150	---	ns
t_f	Turn-off Fall Time		---	85	---	ns
E_{on}	Turn-on Switching Loss		---	0.7	---	mJ
E_{off}	Turn-off Switching Loss		---	0.97	---	mJ
E_{ts}	Total Switching Loss		---	1.67	---	mJ
C_{ies}	Input Capacitance	$V_{CE}=25V$	---	9600	---	pF
C_{oes}	Output Capacitance	$V_{GE}=0V$	---	310	---	pF
C_{res}	Reverse Transfer Capacitance	$f=1\text{MHz}$	---	100	---	pF

Diode Characteristics ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=75A$	---	1.5	3.0	V
t_{rr}	Diode Reverse Recovery Time	$V_{CE}=400V$ $I_F=75A$ $di_F/dt=500A/\mu s$	---	107	---	ns
I_{rr}	Diode Peak Reverse Recovery Current		---	17.1	---	A
Q_{rr}	Diode Reverse Recovery Charge		---	1.1	---	μC

Note 1: Repetitive Rating: Pulse width limited by maximum junction temperature

Typical Characteristics

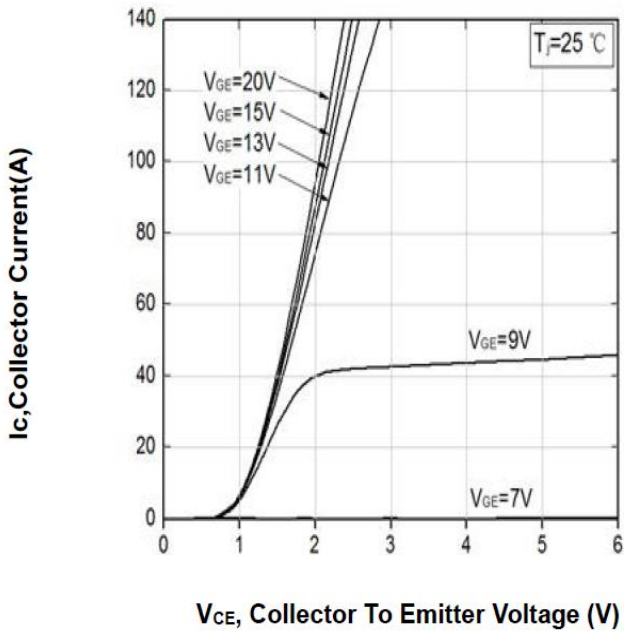


Fig. 1 Typical IGBT Output Characteristics at $T_J=25^\circ\text{C}$

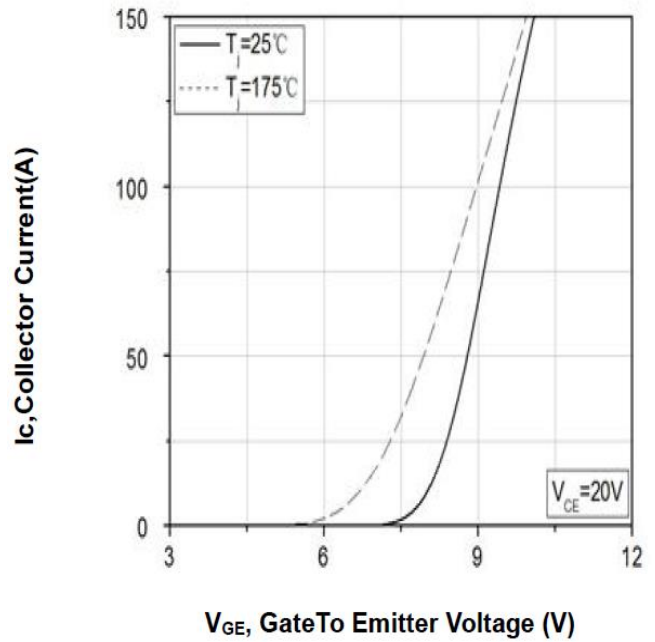


Fig. 2 Typical Transfer Characteristics at $V_{CE}=20\text{V}$

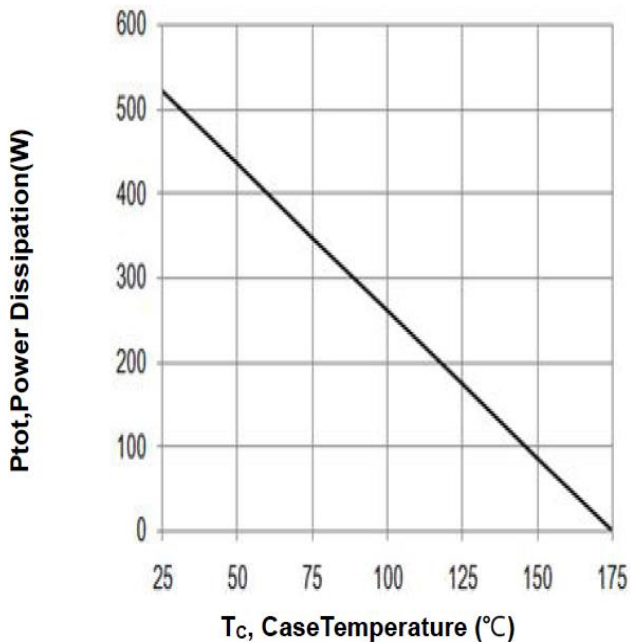


Fig. 3 Power dissipation vs. case temperature ($T_{vj} \leq 175^\circ\text{C}$)

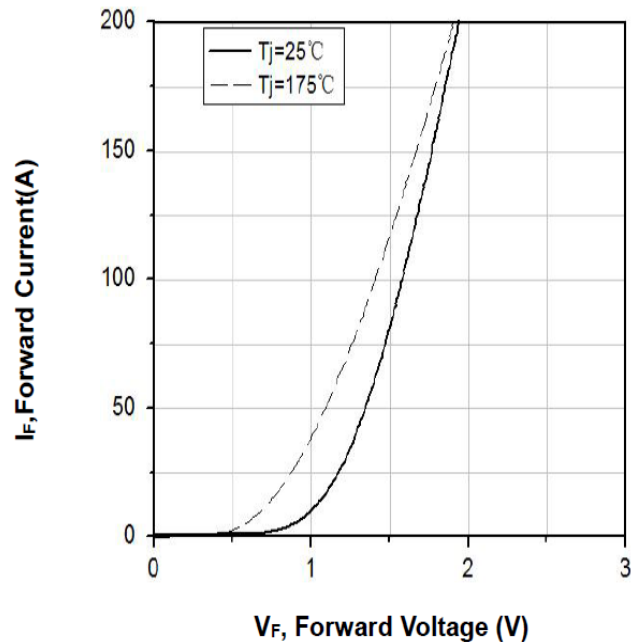


Fig. 4 Forward characteristic of Diode-Inverter

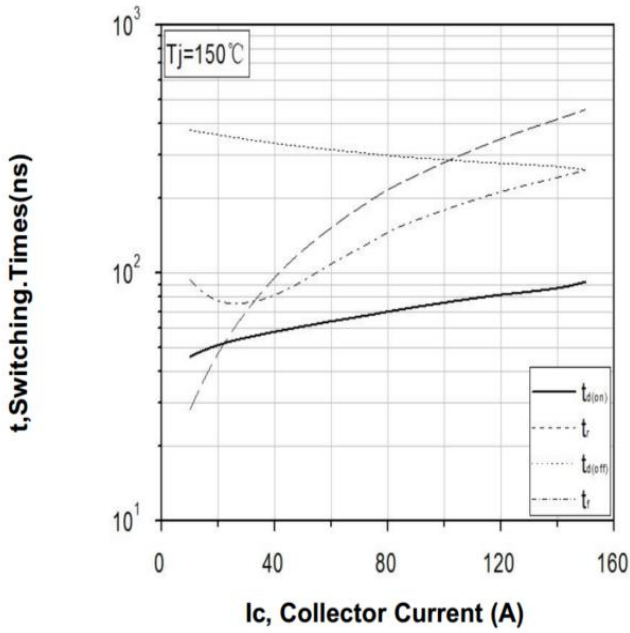


Fig. 5 Typical switching times vs. collector current (Ind. load, $T_j=150^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $R_g=12\ \Omega$)

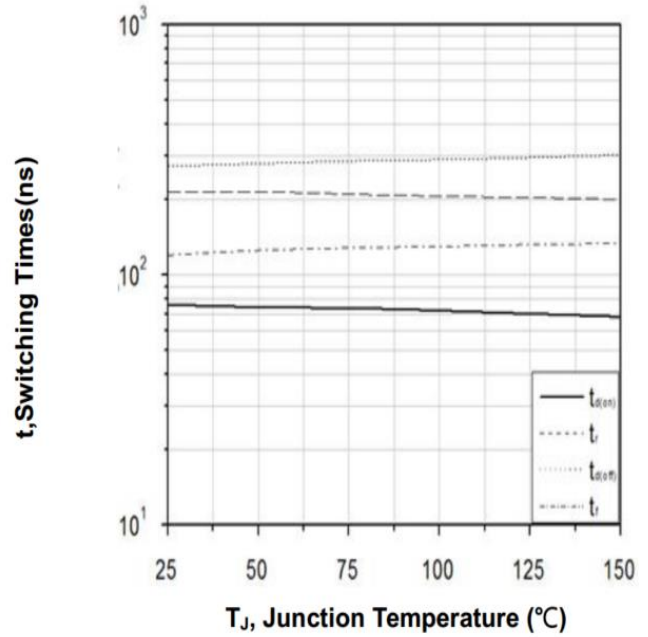


Fig. 6 Typical switching times vs. T_{vj} (Ind. Load, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $I_C=75\text{A}$, $R_g=10\ \Omega$)

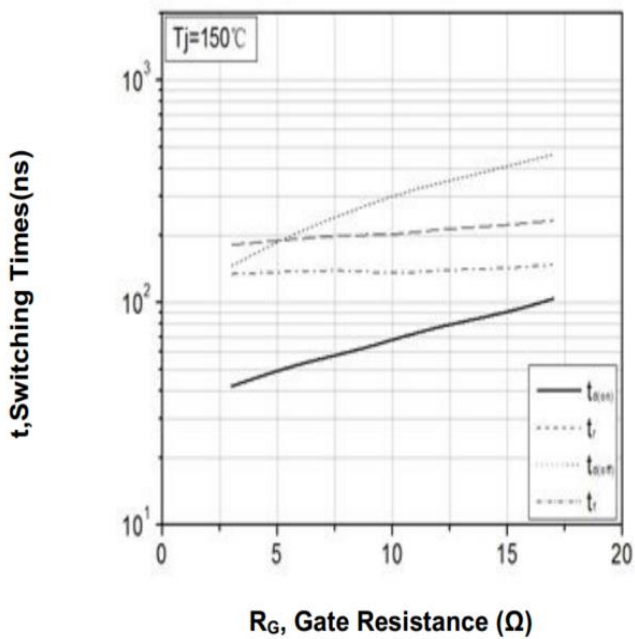


Fig. 7 Typical switching times vs. gate resistor (Ind. Load, $T_j=150^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $I_C=75\text{A}$)

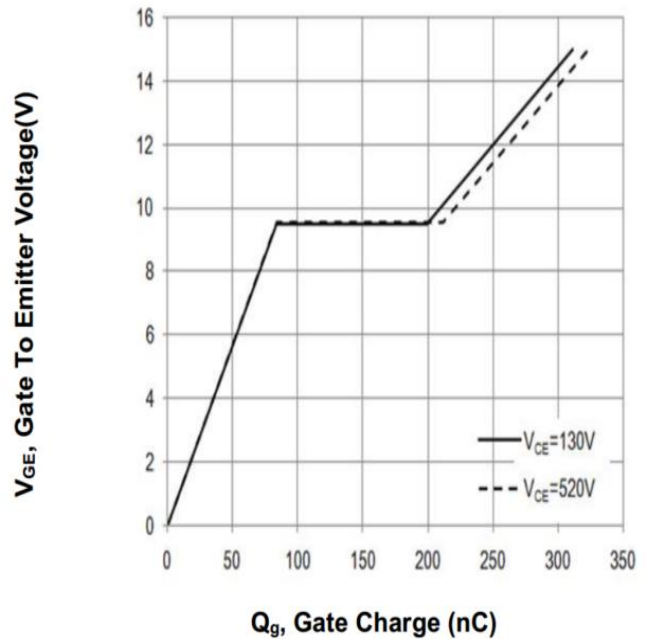


Fig. 8 Typical gate charge ($I_C=75\text{A}$)

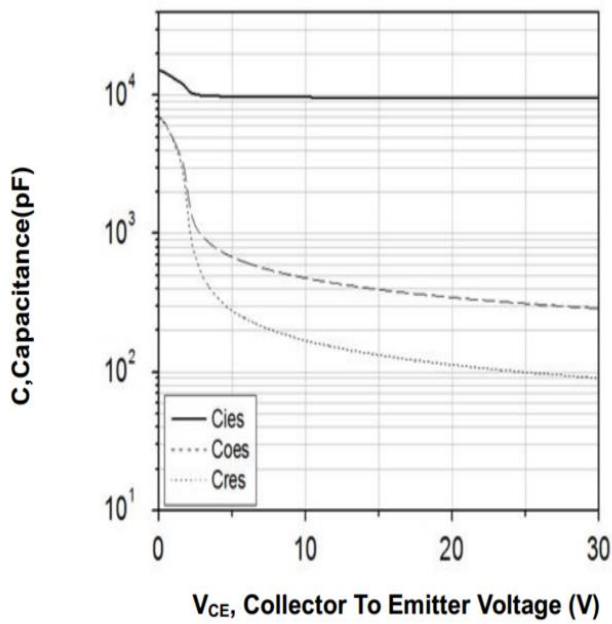


Fig. 9 Typical capacitance vs. collector-emitter voltage ($V_{GE}=0V$, $f=1MHz$)

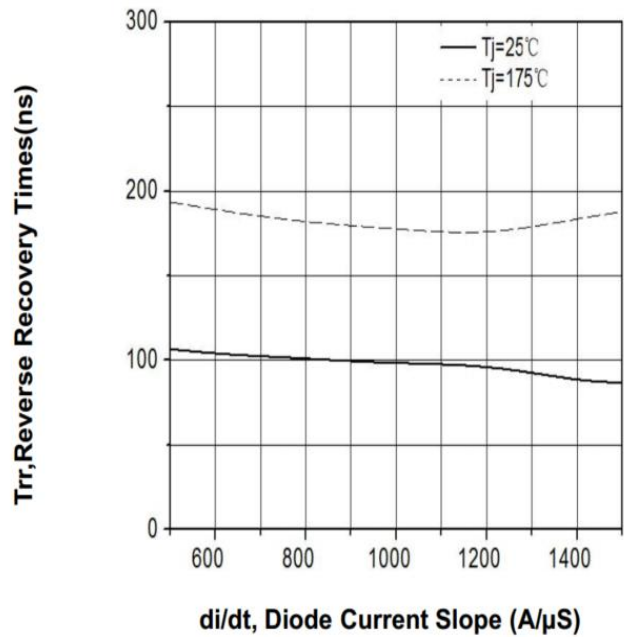


Fig. 10 Typical reverse recovery time vs. diode current slope ($V_R=400V$)

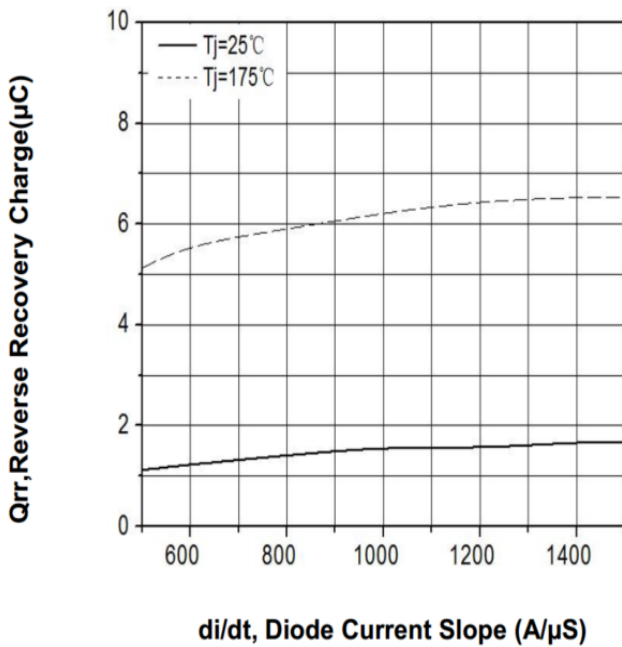


Fig. 11 Typical reverse recovery charge vs. diode current slope ($V_R=400V$)

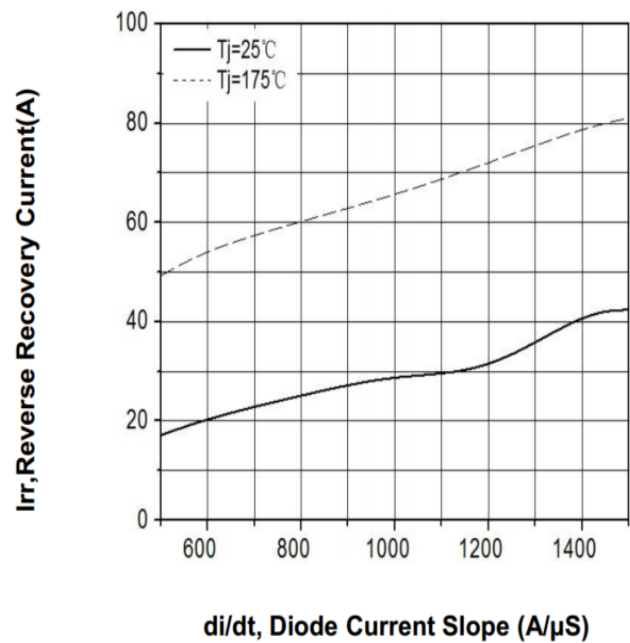
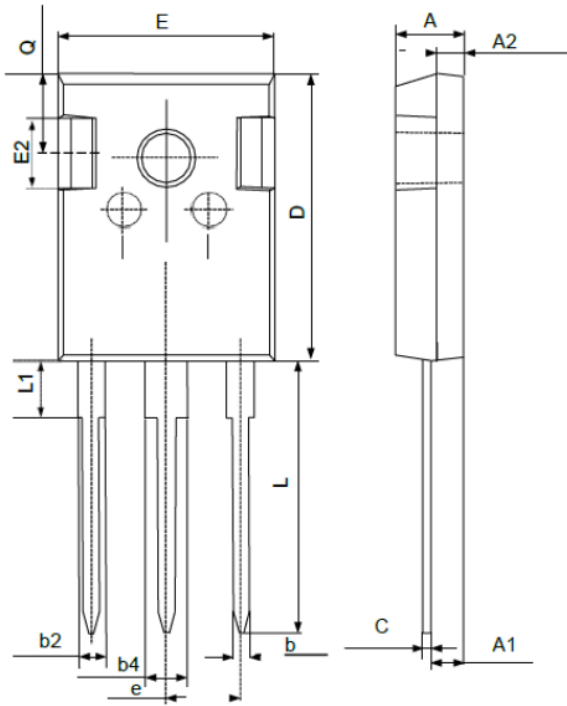


Fig. 12 Typical reverse recovery current vs. diode current slope ($V_R=400V$)

Package Information

TO-247-3



SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	----	1.36
b2	1.91	----	2.25
b4	2.91	----	3.25
c	0.51	----	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e	5.44 BSC		
L	19.72	19.92	20.22
L1	----	----	4.30
Q	5.60	5.80	6.00