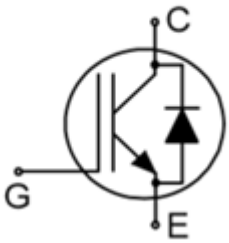
Trench Field-Stop Technology IGBT



Features

- 650V, 75A
- $V_{CE(sat)(typ.)}$ =1.65V@V_{GE}=15V, I_C=75A
- Low Switching Losses
- $V_{CE(sat)}$ with Positive Temperature Coefficient
- Pb-free Lead Plating; RoHS Compliant

Applications

- Charging pile
- Uninterrupted Power Supply
- Solar converters
- Motor Drives

Order codes	V_{CE}	I_C	V_{CEsat}, T_{vj}=25℃	T_{vjmax}	Marking	Package
XD075Q065AY1S3	650V	75A	1.65V	175℃	D75Q65AY1	TO247-3

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Continuous Collector Current (T_C=25℃)	150	A
	Continuous Collector Current (T_C=100℃)	75	A
I_F	Diode Continuous Forward Current (T_C=25℃)	100	A
	Diode Continuous Forward Current (T_C=100℃)	75	A
I_{FM}	Diode Maximum Forward Current (Note 1)	300	A
P_D	Maximum Power Dissipation (T_C=25℃)	625	W
T_J	Operating Junction Temperature Range	-40 to 175	℃
T_{STG}	Storage Temperature Range	-55 to 175	℃

Thermal Data

Symbol	Parameter	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	0.24	℃/W

Electrical Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}=0V, I_C=250uA	650	---	---	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}=650V, V_{GE}=0V	---	---	80	uA
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=250uA	3.5	---	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C=75A	---	1.65	2.1	V
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V	---	26	---	ns
t_r	Turn-on Rise Time	V_{GE}=±15V	---	120	---	ns
$t_{d(off)}$	Turn-off Delay Time	I_C=75A	---	94	---	ns
t_f	Turn-off Fall Time	R_G=5Ω	---	78	---	ns
E_{on}	Turn-on Switching Loss	Inductive Load	---	2.7	---	mJ
E_{off}	Turn-off Switching Loss	T_C=25℃	---	1.6	---	mJ
C_{ies}	Input Capacitance	V_{CE}=25V	---	2643	---	pF
C_{oes}	Output Capacitance	V_{GE}=0V	---	325	---	pF
C_{res}	Reverse Transfer Capacitance	f =1MHz	---	58	---	pF

Diode Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=75A	---	2.0	2.6	V
t_{rr}	Diode Reverse Recovery Time	V_R=200V I_F=75A V_{GE}=0V	---	49	---	ns
I_{rr}	Diode Peak Reverse Recovery Current		---	4.3	---	A
Q_{rr}	Diode Reverse Recovery Charge		---	121	---	nC

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

Typical Characteristics

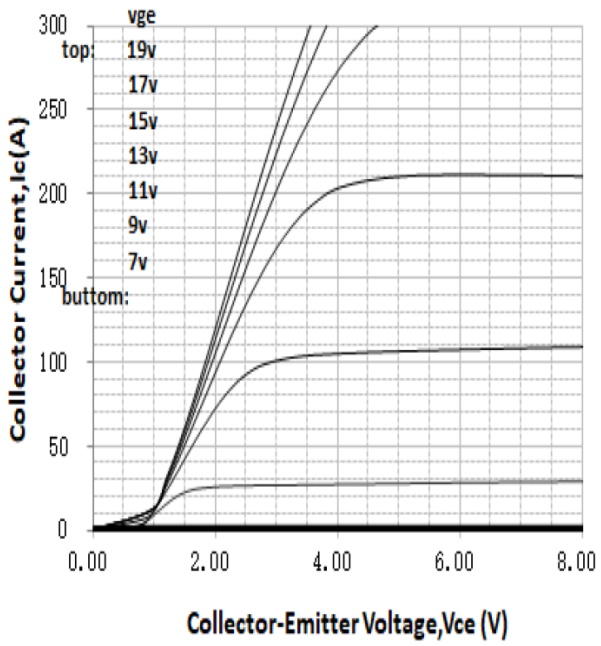


Fig. 1 Typical IGBT Output Characteristics at T_J=25℃

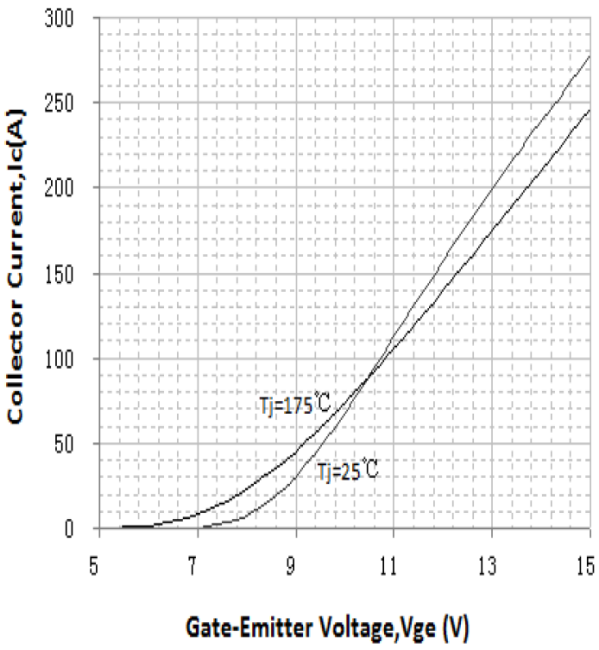


Fig. 2 Typical Transfer Characteristics

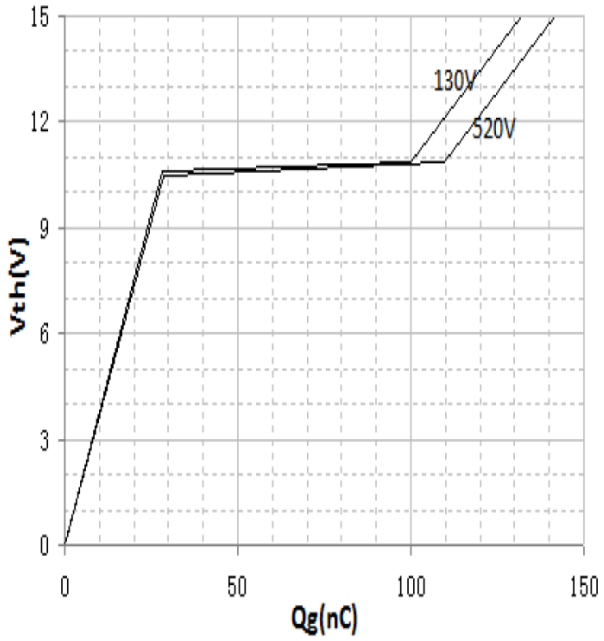


Fig. 3 Gate charge characteristics

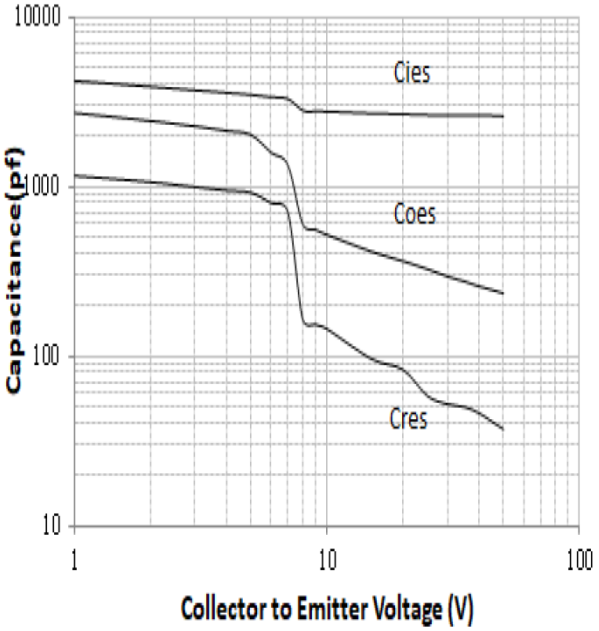


Fig. 4 Capacitance characteristics

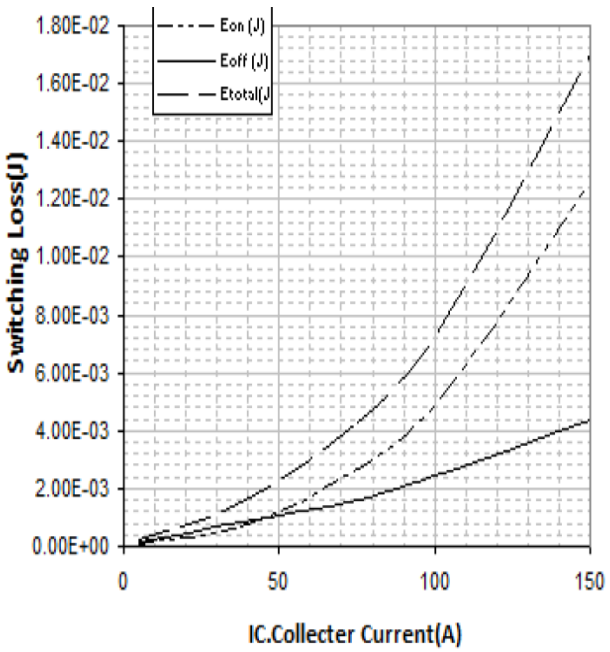


Fig. 5 Typical Energy Loss vs. Ic at T_C=25℃, V_{CE}=400V, V_{GE}=15V,Rg=5Ω

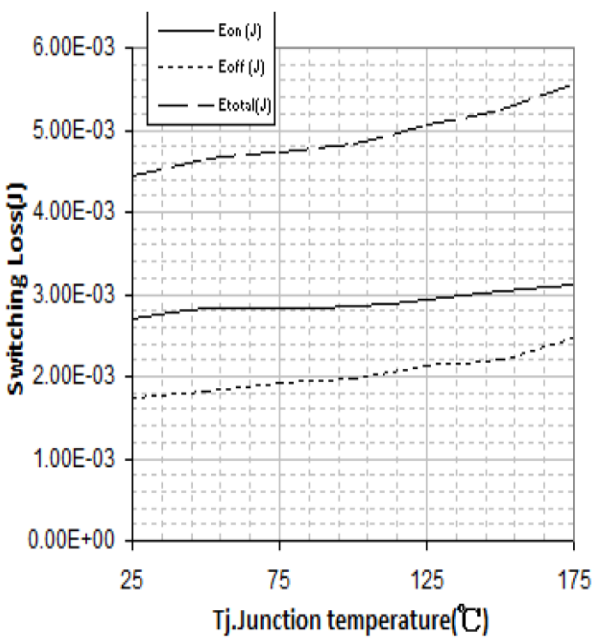


Fig. 6 Typical Switching Time vs. T_j at V_{CE}=400V, V_{GE}=15V, I_C=75A,Rg=5Ω

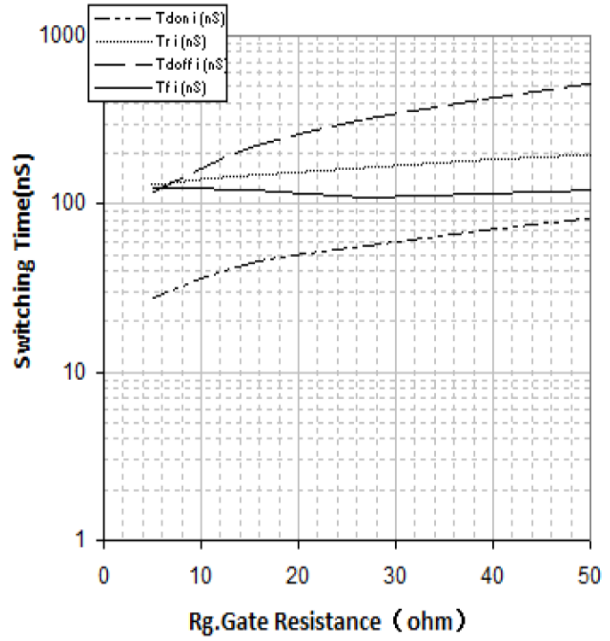


Fig. 7 Switching times vs. gate current

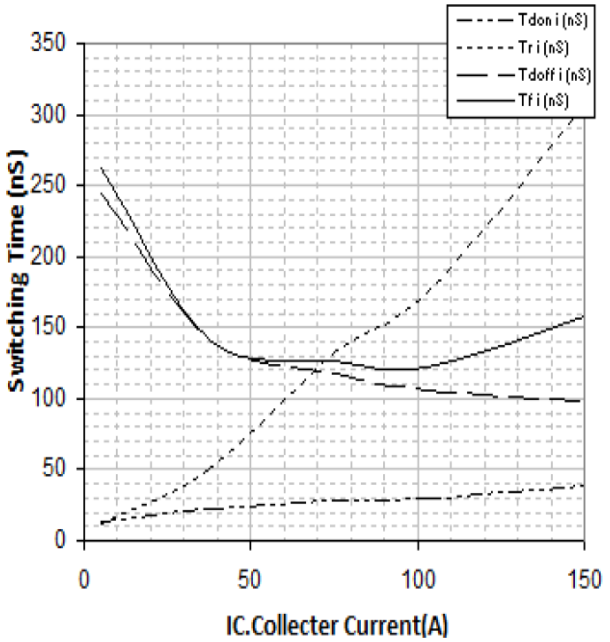
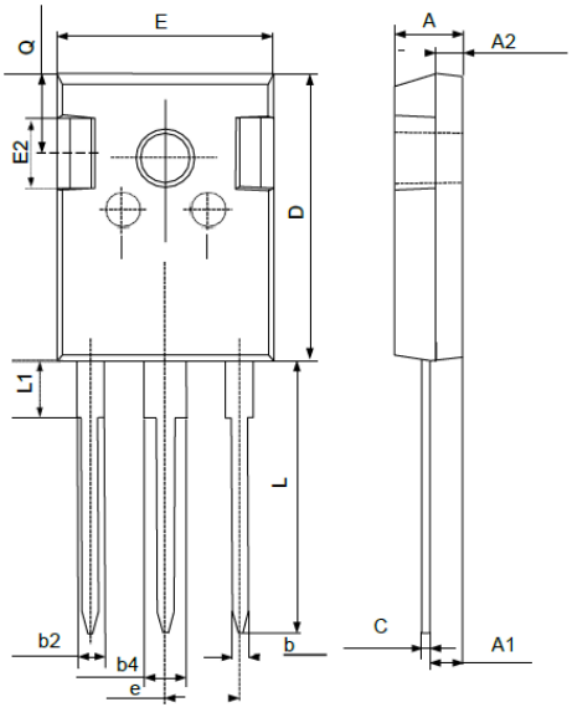


Fig. 8 Switching times vs. collector current

Package Information

TO-247



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