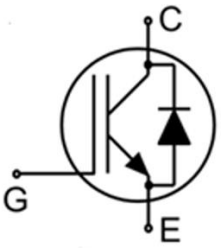
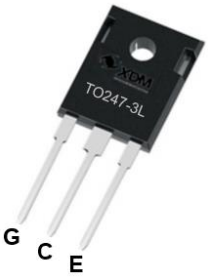
Trench Field-Stop Technology IGBT

Features

- 1200V, 50A
- $V_{CE(sat)(typ.)}$ =1.9V@V_{GE}=15V, I_C=50A
- Maximum Junction Temperature 175℃
- Pb-free Lead Plating; RoHS Compliant





Applications

- Solar Converters
- Uninterrupted Power Supply
- Welding Converters
- Mid to High Range Switching Frequency Converters

Key Performance and Package Parameters

Order codes	V_{CE}	I_C	V_{CEsat}, T_{vj}=25℃	T_{vjmax}	Marking	Package
XD050H120AY1S4	1200V	50A	1.9V	175℃	D50H120AY1	TO247plus

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Continuous Collector Current (T_C=25℃)	100	A
	Continuous Collector Current (T_C=100℃)	50	A
I_{CM}	Pulsed Collector Current (Note 1)	200	A
P_D	Maximum Power Dissipation (T_C=25℃)	245	W
	Maximum Power Dissipation (T_C=100℃)	130	W
T_J	Operating Junction Temperature Range	-40 to 175	℃
T_{STG}	Storage Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Conditions	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	TO247plus	0.65	℃/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=200uA	1200	---	---	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}=1200V, V_{GE}=0V	---	---	10	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}=20V, V_{CE}=0V	---	---	100	nA
	Gate Leakage Current, Reverse	V_{GE}=-20V, V_{CE}=0V	---	---	100	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}=V_{CE}, I_C=600uA	5.0	6.0	7.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C=50A, T_j=25℃	---	1.9	2.8	V
Q_G	Total Gate Charge	V_{CC}=960V V_{GE}=15V I_C=50A	---	160	---	nC
Q_{GE}	Gate-Emitter Charge		---	52	---	nC
Q_{GC}	Gate-Collector Charge		---	67	---	nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V V_{GE}=±15V I_C=50A R_G=10Ω Inductive Load T_C=25℃	---	56	---	ns
t_r	Turn-on Rise Time		---	106	---	ns
$t_{d(off)}$	Turn-off Delay Time		---	170	---	ns
t_f	Turn-off Fall Time		---	166	---	ns
E_{on}	Turn-on Switching Loss		---	2.59	---	mJ
E_{off}	Turn-off Switching Loss		---	2.26	---	mJ
E_{ts}	Total Switching Loss		---	4.85	---	mJ
C_{ies}	Input Capacitance	V_{CE}=25V V_{GE}=0V f =1MHz	---	4517	---	pF
C_{oes}	Output Capacitance		---	232	---	pF
C_{res}	Reverse Transfer Capacitance		---	73	---	pF

Diode Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=50A, T_j=25℃	---	2.0	2.4	V
t_{rr}	Diode Reverse Recovery Time	VR=600V I_F=50A dI_F/dt=500A/us T_C=25℃	---	292	---	ns
I_{rr}	Diode peak Reverse Recovery Current		---	18.4	---	A
Q_{rr}	Diode Reverse Recovery Charge		---	2486	---	nC

Note1：Repetitive rating, pulse width limited by maximum junction temperature

Typical Characteristics

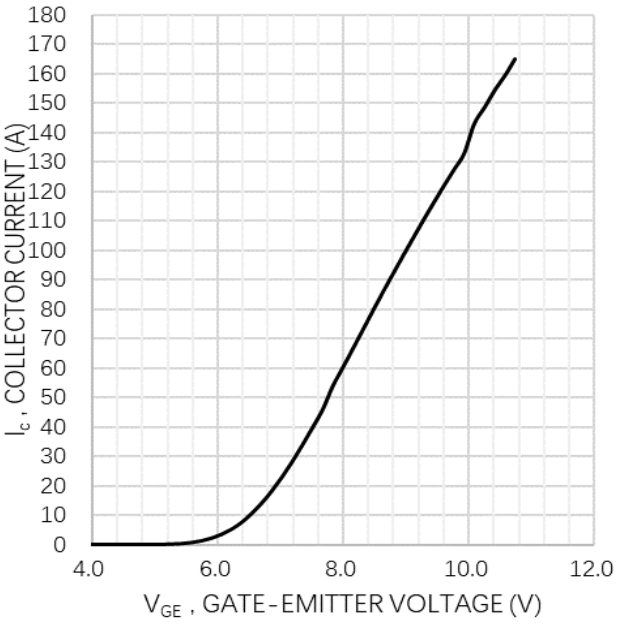


Fig. 1 Typical transfer characteristics (V_{CE}=20V)

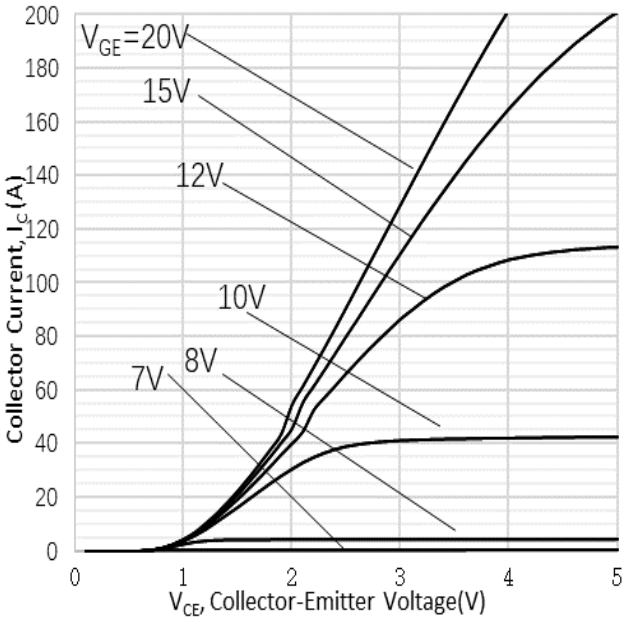


Fig. 2 Typical output characteristic (T_{vj}=25℃)

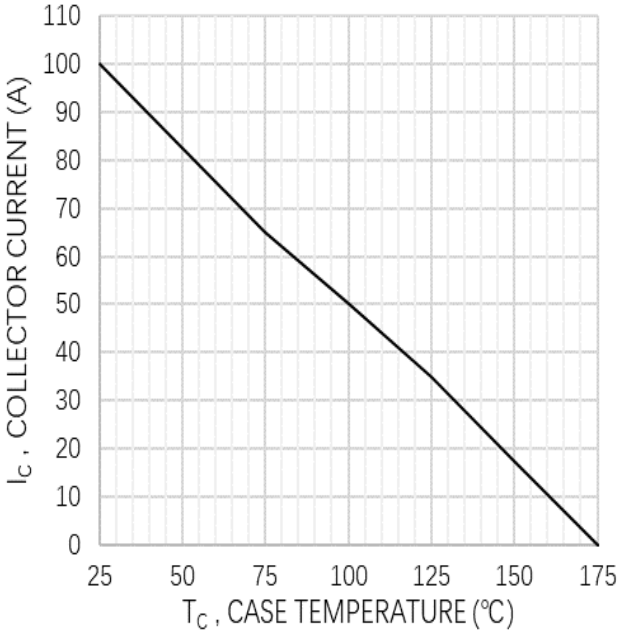


Fig. 3 Collector current as a function of case temperature (V_{GE}≥15V,T_{vj}≤175℃)

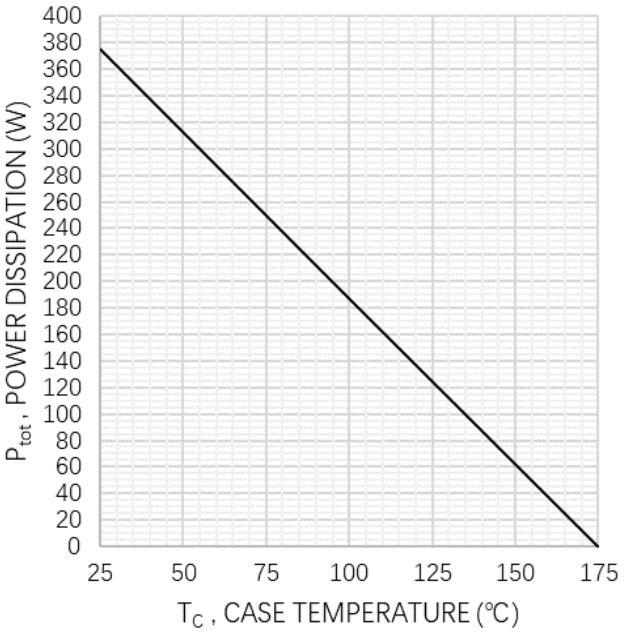


Fig. 4 Power dissipation as a function of case temperature (T_{vj}≤175℃)

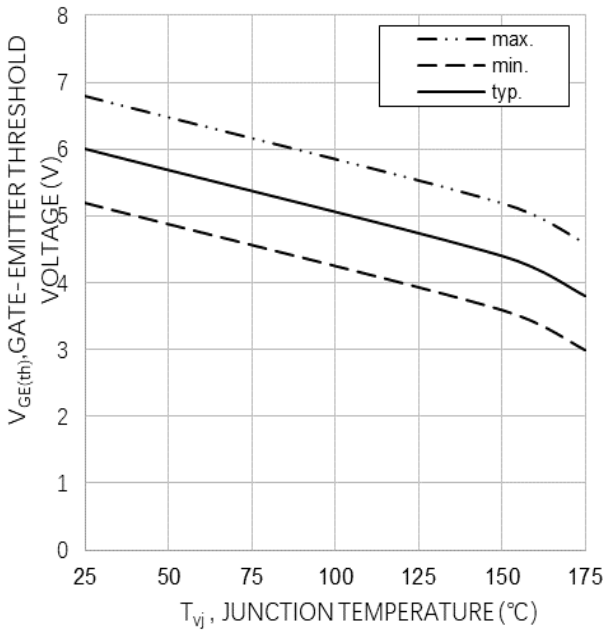


Fig. 5 Gate-emitter threshold voltage as a function of junction temperature (I_C=0.60mA)

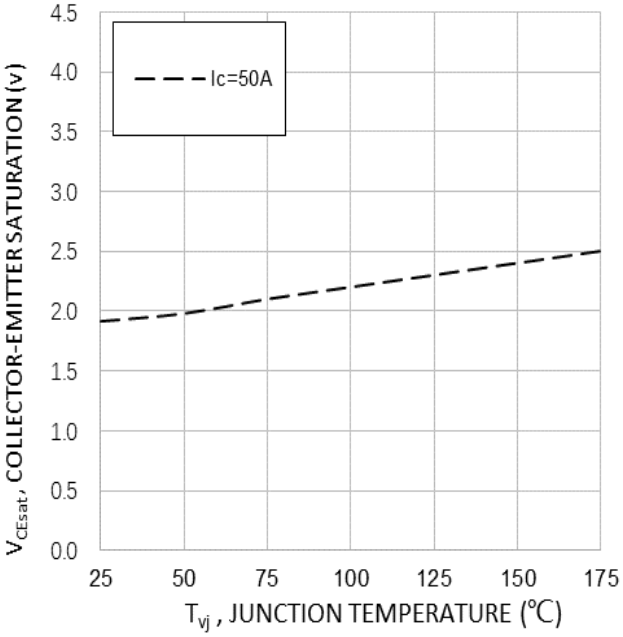


Fig. 6 Typical collector-emitter saturation voltage as a function of junction temperature (V_{GE}=15V)

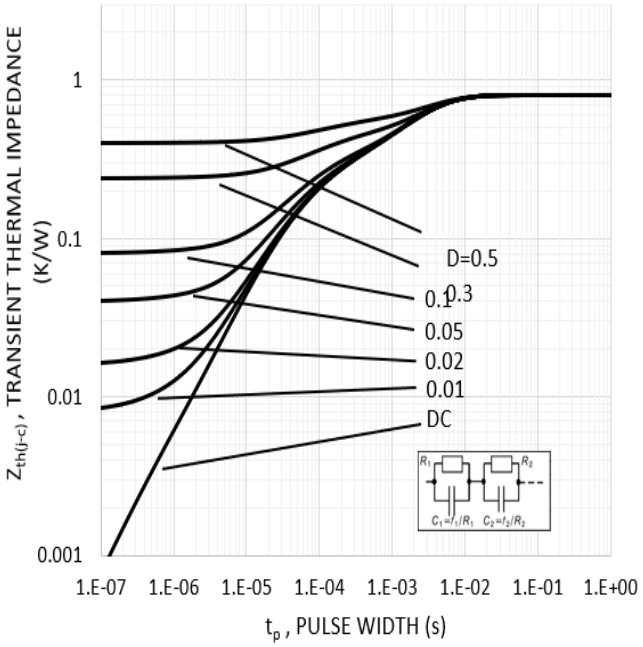


Fig. 7 IGBT transient thermal impedance (D=t_p/T)

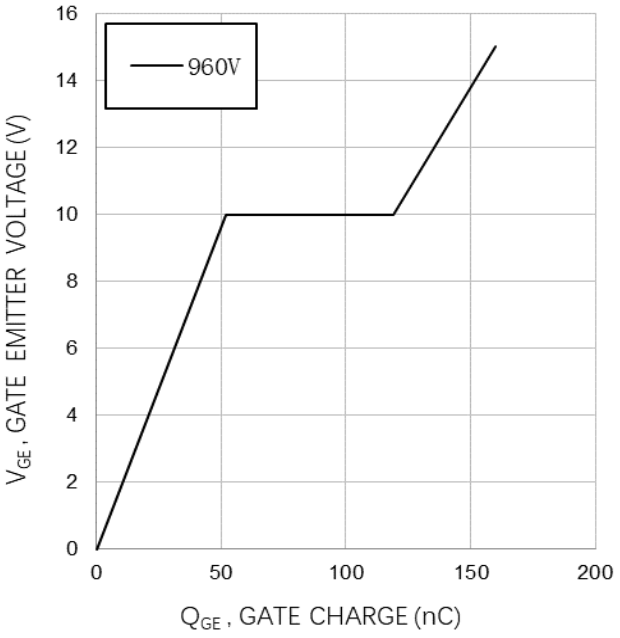


Fig. 8 Typical gate charge

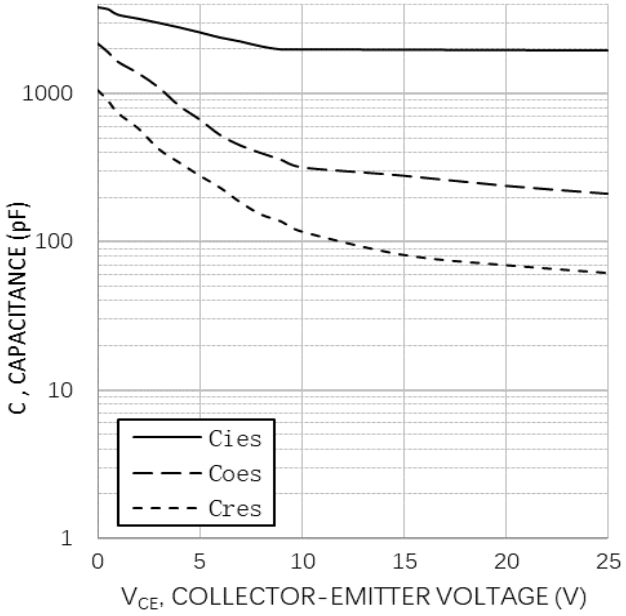
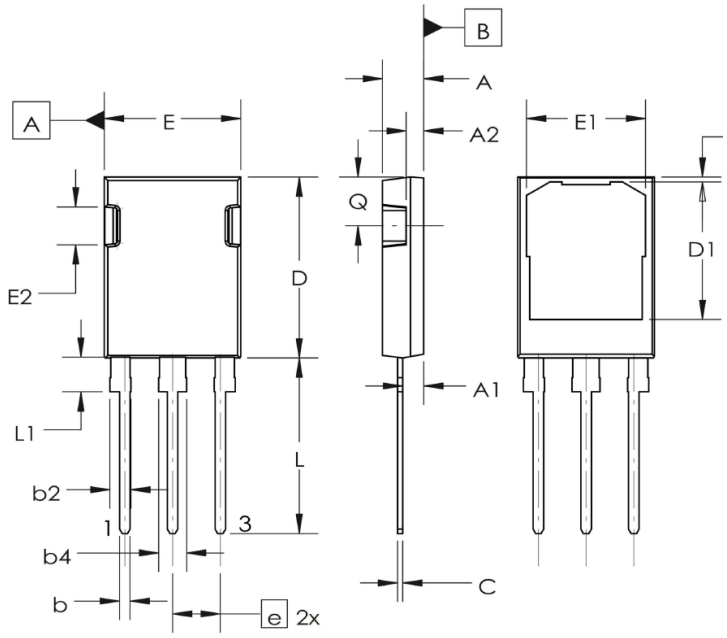


Fig. 9 Typical capacitance as a function of collector-emitter voltage (V_{GE}=0V, f=1MHz)

Package Information

TO-247-3L



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.60	4.70	4.80
A1	2.10	2.40	2.70
A2	1.70	2.00	2.30
b	1.16	1.20	1.26
b2	2.20	2.40	2.60
b4	3.00	3.20	3.40
c	0.59	0.60	0.66
D	20.40	20.60	20.80
D1	15.47	15.67	15.87
D2	0.25	0.55	0.85
e	5.45 BSC		
E	15.40	15.60	15.80
E1	13.40	13.60	13.80
E2	4.12	4.30	4.52
L	19.70	20.00	20.30
L1	3.65	3.85	4.05
Q	5.35	5.55	5.75