

Product Summary

$V_{(BR)CES}$	$V_{CE(SAT)TYP}$	$I_C(T_C=100^{\circ}C)$
650V	1.8V@15V	75A

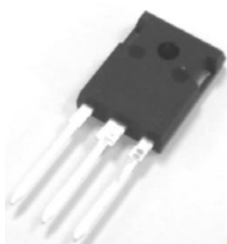
Feature

- Trench and field-stop technology
- Easy parallel switching capability

Application

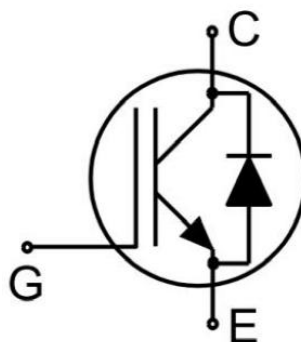
- PFC applications
- Uninterruptible power supplies
- Solar inverters

Package

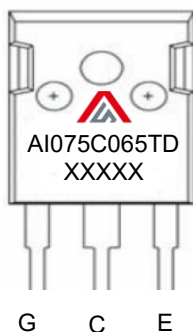


TO-247AB

Circuit diagram



Marking



Absolute maximum ratings ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	650	V
Gate- Emitter Voltage	V_{GES}	± 20	V
Collector Current	I_C	150	A
Collector Current ($T_c=100^{\circ}\text{C}$)	$I_C(100^{\circ}\text{C})$	75	A
Pulsed Collector Current, tp limited by T_{jmax}	I_{CM}	300	A
Diode Continuous Forward Current ($T_c=100^{\circ}\text{C}$)	$I_F(100^{\circ}\text{C})$	75	A
Diode Maximum Forward Current	I_{FM}	300	A
Power Dissipation	P_D	535	W
Power Dissipation ($T_c=100^{\circ}\text{C}$)		267	W
Thermal Resistance, Junction to case for Diode	$R_{\theta JC}$	0.48	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to case for IGBT	$R_{\theta JC}$	0.28	$^{\circ}\text{C/W}$
Operating junction temperature range	T_J	$-40 \sim +175$	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim +175$	$^{\circ}\text{C}$

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Static Characteristics							
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=250\mu A$	650			V	
Collector-Emitter Leakage Current	I_{CES}	$V_{GE}=0V, V_{CE}=650V$			50	μA	
Gate to Emitter Leakage Current	I_{GES}	$V_{GE}=\pm 20V, V_{CE}=0V$			± 100	nA	
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=1mA$	5.0	5.4	5.6	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A$		1.8		V	
		$V_{GE}=15V, I_C=75A, T_J=175^{\circ}C$		2.3			
Dynamic characteristics							
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1MHz$		4250		pF	
Output Capacitance	C_{oes}			205			
Reverse Transfer Capacitance	C_{res}			31			
Total Gate Charge	Q_g	$V_{CC}=520V, V_{GE}=15V, I_C=75A$		130		nC	
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, V_{GE}=0/15V, I_C=75A, R_G=10\Omega, \text{Inductive Load}$		53		nS	
Turn-on rise time	t_r			132			
Turn-off delay time	$t_{d(off)}$			162			
Turn-off fall time	t_f			95			
Turn-On Switching Loss	E_{on}			3.3		mJ	
Turn-Off Switching Loss	E_{off}			2.2			
Total Switching Loss	E_{is}			5.5			
Turn-on delay time	$t_{d(on)}$		$V_{CC}=400V, V_{GE}=0/15V, I_C=75A, R_G=10\Omega, \text{Inductive Load}, T_J=175^{\circ}C$		53		nS
Turn-on rise time	t_r				128		
Turn-off delay time	$t_{d(off)}$			181			
Turn-off fall time	t_f			107			
Turn-On Switching Loss	E_{on}			4.8		mJ	
Turn-Off Switching Loss	E_{off}			2.7			
Total Switching Loss	E_{is}			7.5			

Electrical characteristics of the Diode ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{FM}	$I_F=75\text{A}$		1.8		V
		$I_F=75\text{A}, T_J=175^{\circ}\text{C}$		1.4		
Reverse Recovery Time	t_{rr}	$V_R=400\text{V}, I_F=75\text{A},$ $dif/dt=-450\text{A}/\mu\text{s}$		129		nS
Diode Peak Reverse Recovery Current	I_{RRM}			14		A
Reverse Recovery Charge	Q_{rr}			778		nC
Reverse Recovery Time	t_{rr}	$V_R=400\text{V}, I_F=75\text{A},$ $dif/dt=-450\text{A}/\mu\text{s},$ $T_J=175^{\circ}\text{C}$		172		nS
Diode Peak Reverse Recovery Current	I_{RRM}			22		A
Reverse Recovery Charge	Q_{rr}			2200		nC

Typical Characteristics

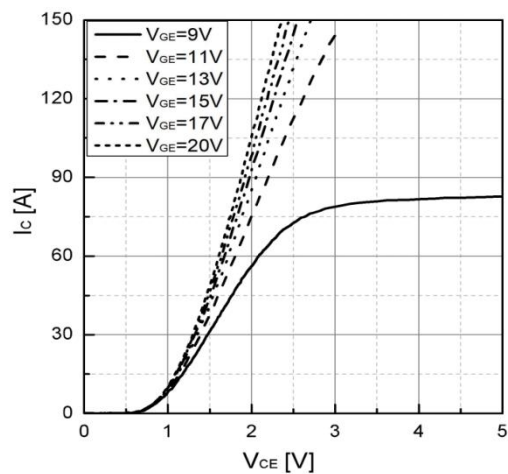


Fig 1. Typical output characteristic ($T_{vj}=25^{\circ}\text{C}$)

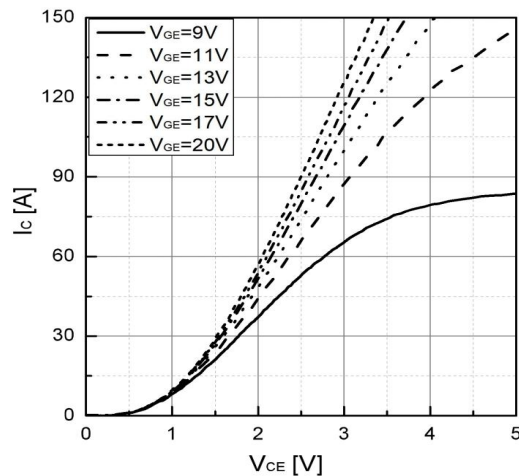


Fig 2. Typical output characteristic ($T_{vj}=175^{\circ}\text{C}$)

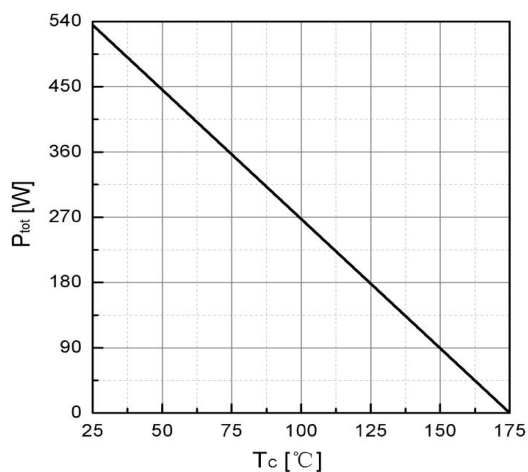


Fig 3. Power dissipation as a function of T_c

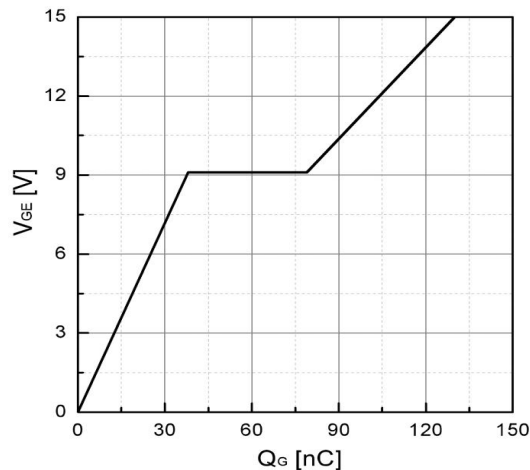


Fig 4. Typical Gate charge

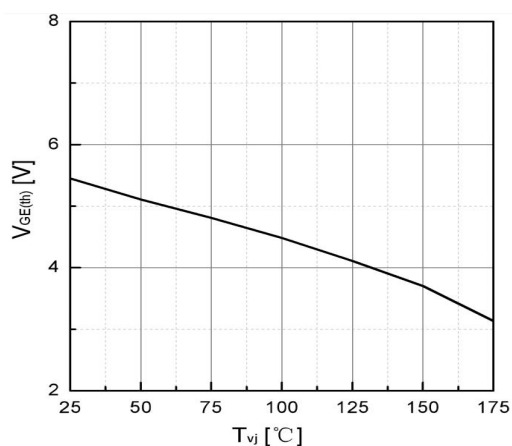


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj}
($I_c=1\text{mA}$)

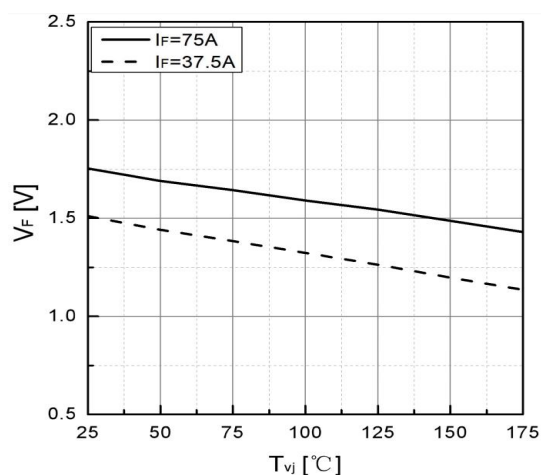


Fig 6. Typical V_F as a function of T_{vj}

Typical Characteristics

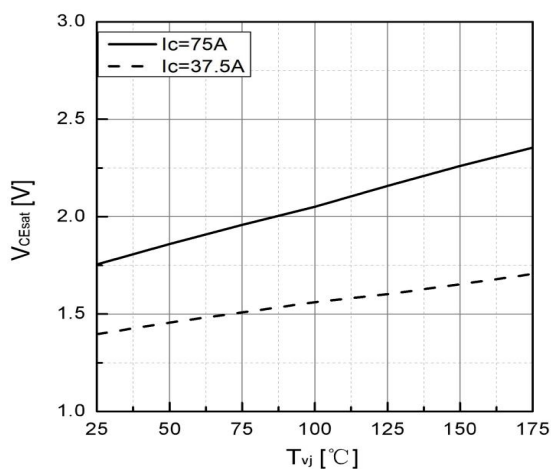


Fig 7. Typical V_{CEsat} as a function of T_{vj}

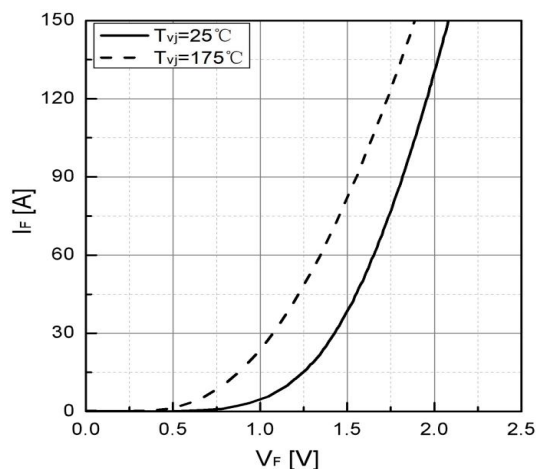


Fig 8. Typical I_F as a function of V_F

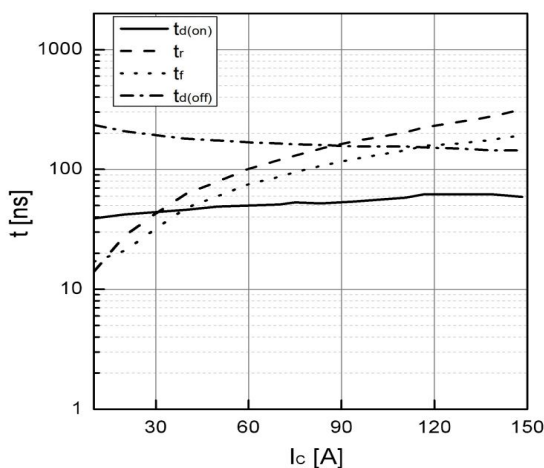


Fig 9. Typical switching time as a function of I_c

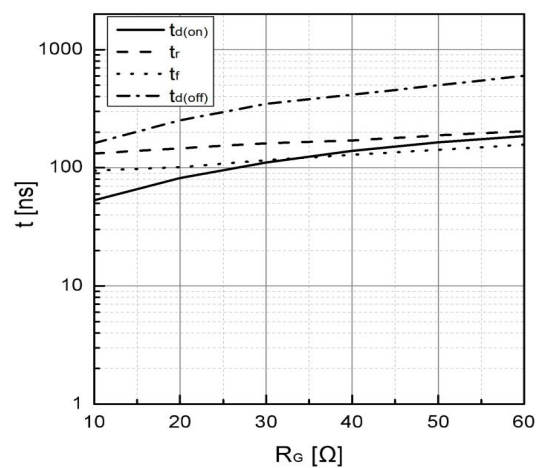


Fig 10. Typical switching times as a function of R_G

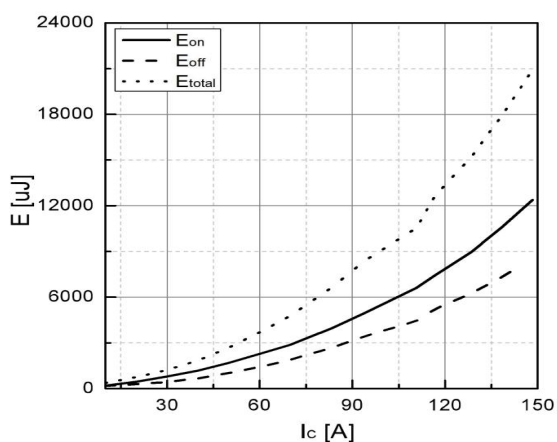


Fig 11. Typical switching energy losses as a function of I_c

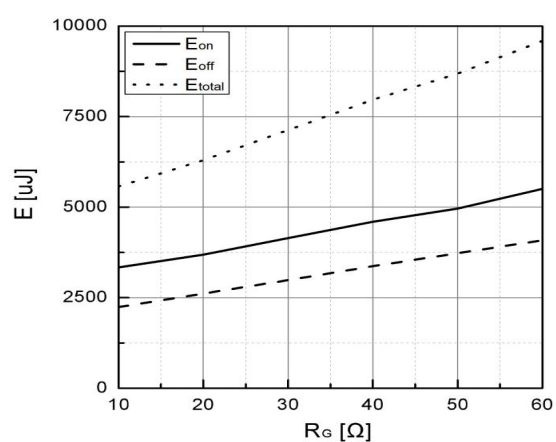


Fig 12. Typical switching energy losses as a function of R_G

Typical Characteristics

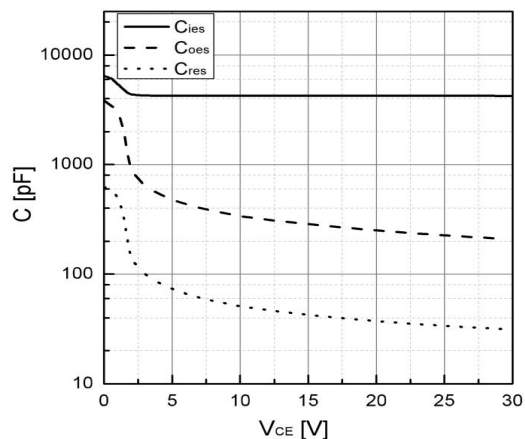


Fig 13. Typical capacitance as a function of V_{CE}
($f=1\text{MHz}$, $V_{GE}=0\text{V}$)

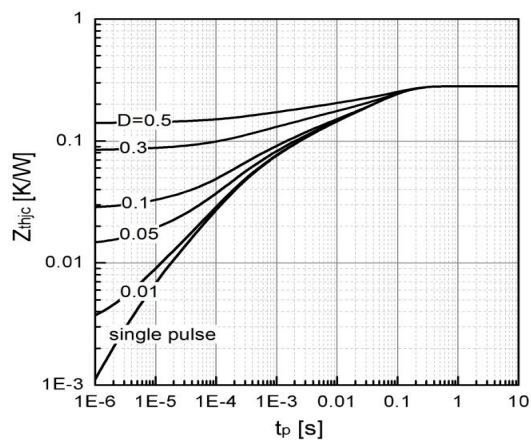
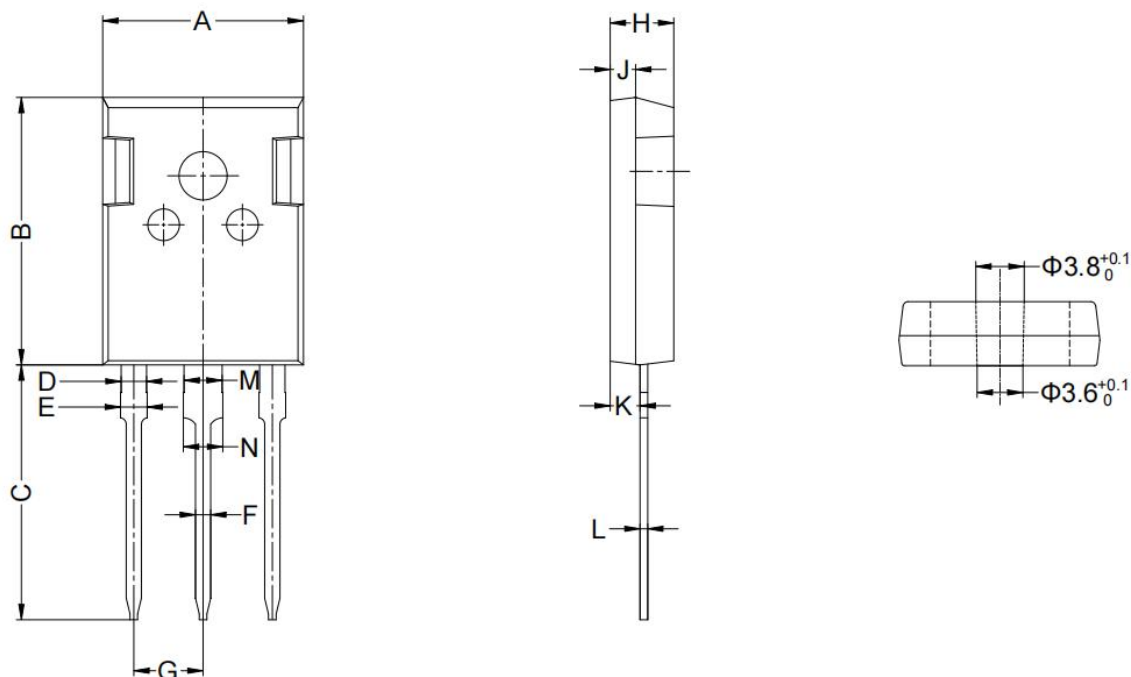


Fig 14. Transient thermal impedance of IGBT

TO-247AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	15.500	16.100	0.610	0.634
B	20.800	21.200	0.819	0.835
C	19.700	20.300	0.776	0.799
D	1.800	2.200	0.071	0.087
E	1.900	2.300	0.075	0.091
F	1.000	1.400	0.039	0.055
G	5.250	5.650	0.207	0.222
H	4.800	5.200	0.189	0.205
J	1.900	2.100	0.075	0.083
K	2.200	2.500	0.087	0.098
L	0.410	0.790	0.016	0.031
M	2.800	3.200	0.110	0.126
N	2.900	3.300	0.114	0.130