

Product Summary

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

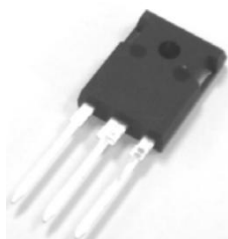
Feature

- Trench and field-stop technology
- Easy parallel switching capability
- High efficiency for inverters
- High ruggedness performance

Application

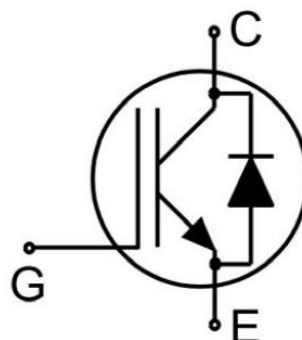
- PFC applications
- Uninterruptible power supplies
- Solar inverters

Package

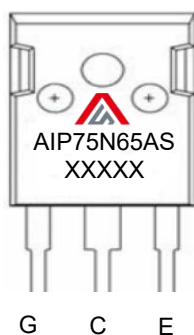


TO-247AB

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
Continuous 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, t_p limited by T_{vjmax}	I_{CM}	300	A
Diode Continuous Forward Current($T_C = 100^{\circ}\text{C}$)	$I_F(100^{\circ}\text{C})$	75	A
Diode Forward Pulsed Current, t_p limited by T_{vjmax}	I_{FM}	300	A
Power Dissipation	P_D	535	W
Thermal Resistance, Junction to case for IGBT	$R_{\theta JC}$	0.28	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to case for Diode	$R_{\theta JC}$	0.48	$^{\circ}\text{C/W}$
Thermal resistance, junction to ambient	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$
Junction Temperature Range	T_{vj}	$-40 \sim +175$	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$

Electrical characteristics of the IGBT ($T_{vj}=25^{\circ}\text{C}$ 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
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE} = 15V, I_C = 75A$		1.8		V
		$V_{GE} = 15V, I_C = 75A, T_{vj} = 175^{\circ}\text{C}$		2.3		
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 1mA$	5.0	5.4	5.6	V
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_{ts}			5.5		mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 400V, V_{GE} = 0/15V, I_C = 75A, R_G = 10\Omega, \text{Inductive load}, T_{vj} = 175^{\circ}\text{C}$		53		
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		
Turn-Off Switching Loss	E_{off}			2.7		
Total Switching Loss	E_{ts}			7.5		

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

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

Typical Electrical and Thermal Characteristics

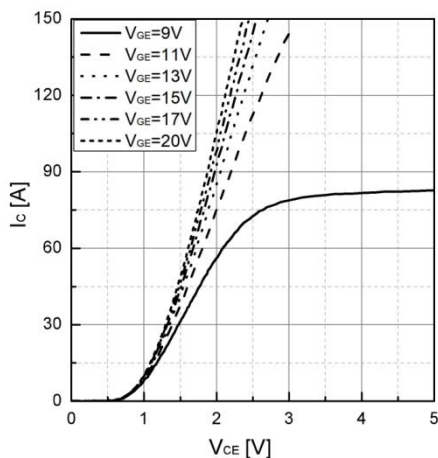


Fig 1. Typical output characteristic ($T_{vj}=25^{\circ}\text{C}$)

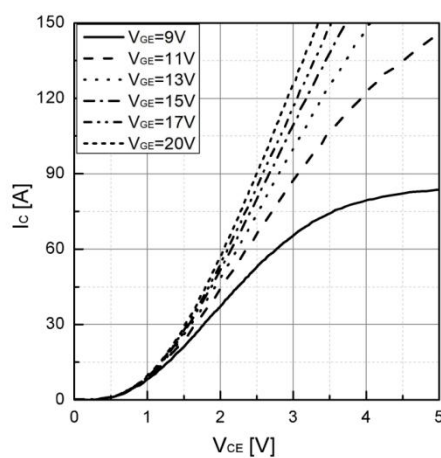


Fig 2. Typical output characteristic ($T_{vj}=175^{\circ}\text{C}$)

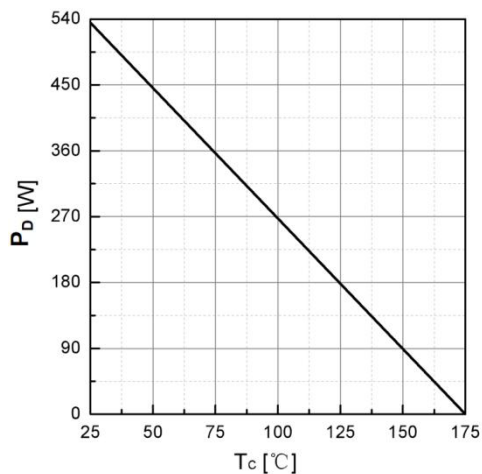


Fig 3. Power dissipation as a function of T_c

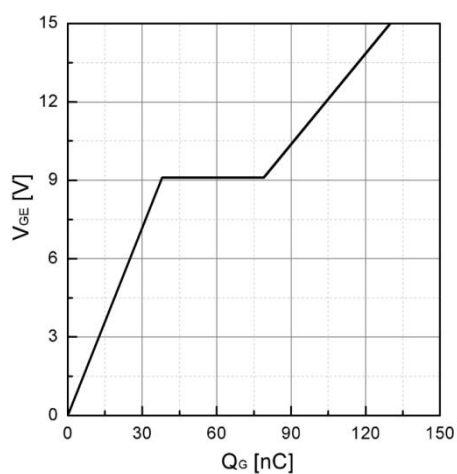


Fig 4. Typical Gate charge

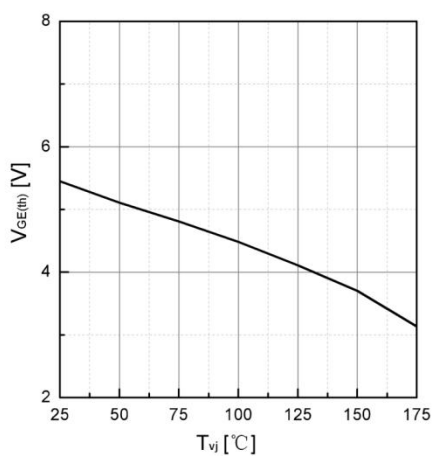


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj}
($I_C=1\text{mA}$)

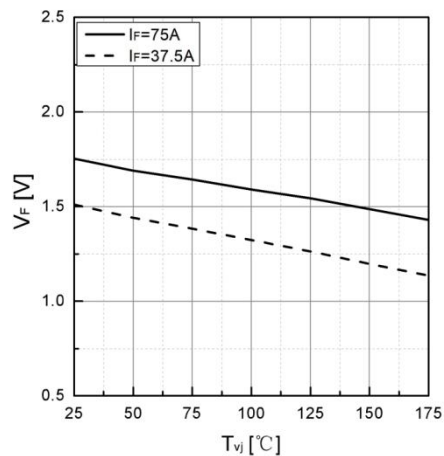


Fig 6. Typical V_F as a function of T_{vj}

Typical Electrical and Thermal Characteristics

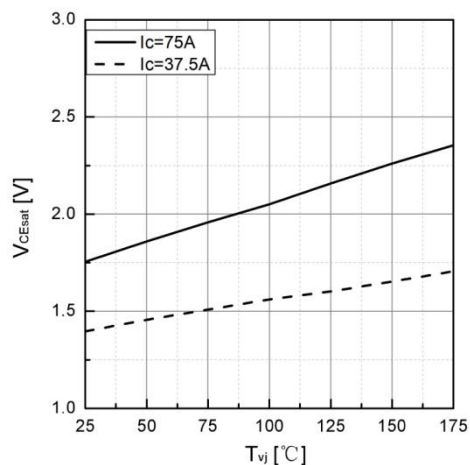


Fig 7. Typical V_{CEsat} as a function of T_{vj}

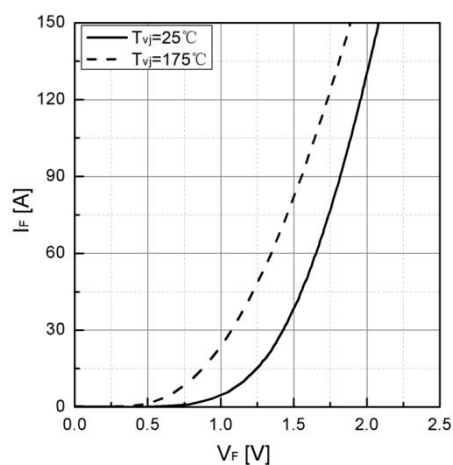


Fig 8. Typical I_F as a function of V_F

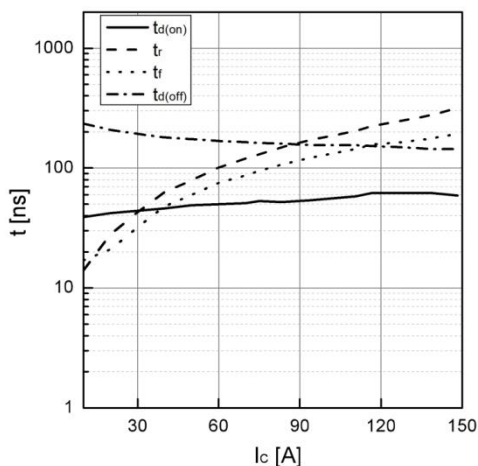


Fig 9. Typical switching time as a function of I_c

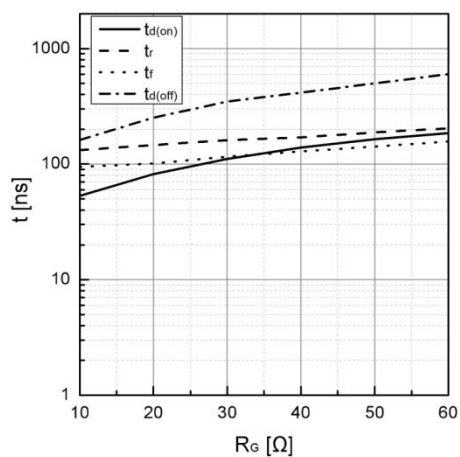


Fig 10. Typical switching times as a function of R_G

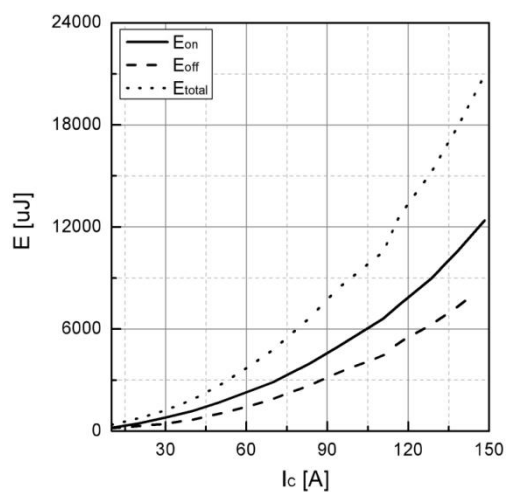


Fig 11. Typical switching energy losses as a function of I_c

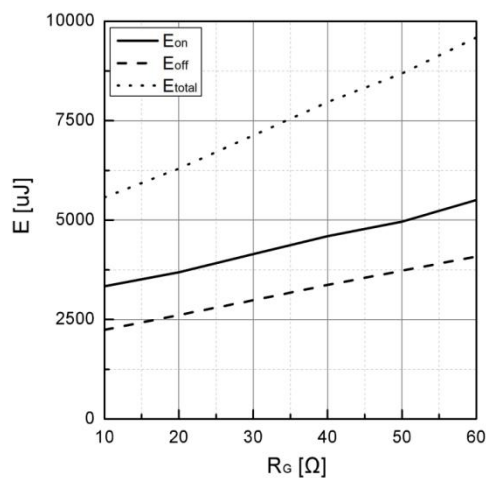


Fig 12. Typical switching energy losses as a function of R_G

Typical Electrical and Thermal Characteristics

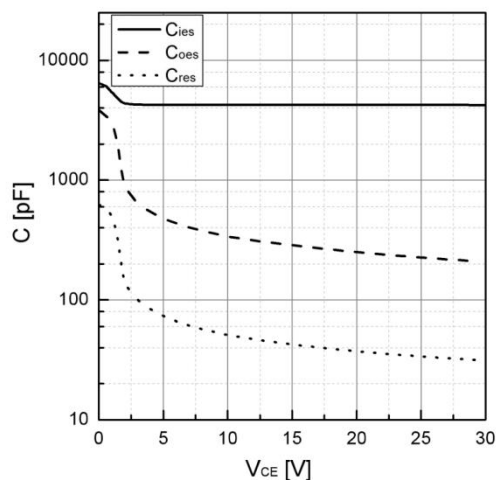


Fig 13. Typical capacitance as a function of V_{CE}
($f=1\text{MHz}$, $V_{GE}=0\text{V}$)

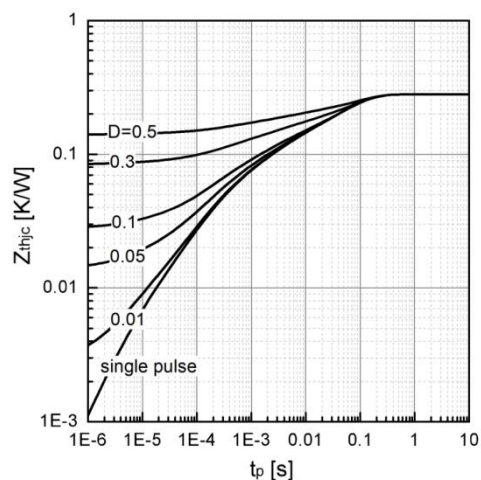
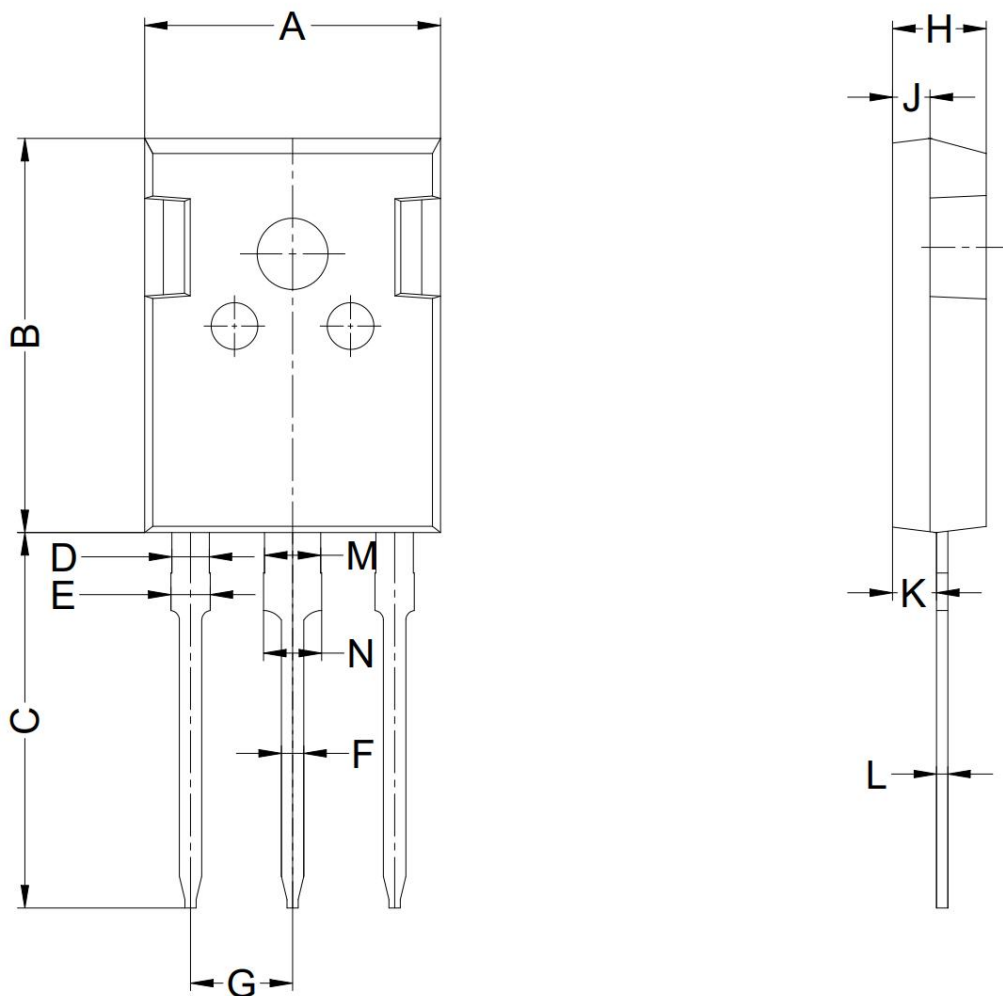


Fig 14. Transient thermal impedance of IGBT

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