

Product Summary

$V_{(BR)CES}$	$V_{CE(SAT)MAX}$	I_c
650V	2.00V@15V	75A

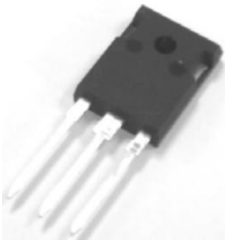
Feature

- High speed smooth switching device for hard & soft switching
- Positive temperature coefficient
- High ruggedness, temperature stable
- High short circuit capability(5us)

Application

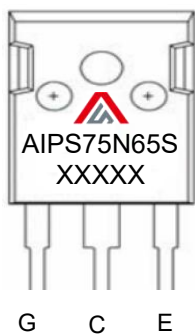
- Resonant converters
- Mid to high range switching frequency converters
- Uninterruptible power supply

Package

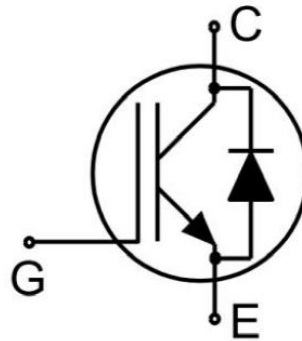


TO-247AB

Marking



Circuit diagram



Absolute maximum ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CES}	650	V
Transient Gate-Emitter Voltage (tp≤10μs,D<0.010)	V _{GES}	±30	V
Continuous Gate- Emitter Voltage	V _{GES}	±20	V
Collector Current	I _C	85	A
Collector Current(T _C =100°C)	I _C (100°C)	80	A
Pulsed Collector Current, tp limited by T _{Jmax} ,V _{GE} =15V	I _{CM}	300	A
Diode Continuous Forward Current	I _F	85	A
Diode Continuous Forward Current(T _C =100°C)	I _F (100°C)	80	A
Diode Forward Pulsed Current,tp limited by T _{Jmax}	I _{Fpuls}	300	A
Turn off Safe Operating Area V _{CE} ≤650V,T _J ≤150°C	-	300	A
Short Circuit Withstand Time, V _{GE} = 15V,V _{CC} =300V, V _{CEM} ≤650V	T _{SC}	5	μs
Power Dissipation(T _J =175°C,T _C =25°C)	P _D	330	W
Thermal Resistance, Junction to case for Diode	R _{θJC}	0.45	°C/W
Thermal Resistance, Junction to case for IGBT	R _{θJC}	0.45	°C/W
Maximum Temperature for Soldering,wave soldering 1.6mm (0.063in.) from case for 10s	T _L	260	°C
Junction Temperature Range	T _J	-40 ~ +175	°C
Storage Temperature Range	T _{STG}	-55 ~ +150	°C

Electrical characteristics of the IGBT (T_J=25°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 _{CE} =250μA	650			V	
Collector-Emitter Leakage Current	I _{CES}	V _{GE} = 0V, V _{CE} =650V			0.25	mA	
		V _{GE} = 0V, V _{CE} =650V, T _J =150°C			3		
Gate to Emitter Leakage Current	I _{GES}	V _{GE} =±30V, V _{CE} = 0V			100	nA	
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V,I _C =75A	1.40	1.70	2.00	V	
		V _{GE} =15V,I _C =75A,T _J =125°C			2.05		
		V _{GE} =15V,I _C =75A,T _J =150°C			2.10		
Gate Threshold Voltage	V _{GE(th)}	V _{CE} =V _{GE} ,I _C =0.75mA	4.8	5.5	6.2	V	
Dynamic characteristics							
Input Capacitance	C _{ies}	V _{CE} =25V,V _{GE} =0V, f =1MHz		4.05		nF	
Reverse Transfer Capacitance	C _{res}			0.04			
Total Gate Charge	Q _g	V _{CC} =520V,V _{GE} =15V,I _C =75A		0.18		μC	
Short Circuit Collector Current	I _{SC}	V _{GE} =15V,t _{sc} ≤5μs,V _{CC} =300V		347		A	
Turn-on delay time	t _{d(on)}	V _{CC} =400V,V _{GE} = -5V~15V, I _C =75A,R _G =10Ω, Inductive Load		35		nS	
Turn-on rise time	t _r			90			
Turn-off delay time	t _{d(off)}			67			
Turn-off fall time	t _f			94			
Turn-On Switching energy	E _{on}				3.7		mJ
Turn-Off Switching energy	E _{off}				1.63		
Total Switching energy	E _{ts}				5.33		
Turn-on delay time	t _{d(on)}		V _{CC} =400V,V _{GE} = -5V~15V, I _C =75A,R _G =10Ω, Inductive Load, T _J =125°C		35		nS
Turn-on rise time	t _r				91		
Turn-off delay time	t _{d(off)}				76		
Turn-off fall time	t _f			124			
Turn-On Switching energy	E _{on}				3.9		mJ
Turn-Off Switching energy	E _{off}				2.01		
Total Switching energy	E _{ts}				7.09		
Turn-on delay time	t _{d(on)}	V _{CC} =400V,V _{GE} = -5V~15V, I _C =75A,R _G =10Ω, Inductive Load, T _J =150°C			35		nS
Turn-on rise time	t _r				92		
Turn-off delay time	t _{d(off)}				80		
Turn-off fall time	t _f			138			
Turn-On Switching energy	E _{on}				3.98		mJ
Turn-Off Switching energy	E _{off}				2.14		
Total Switching energy	E _{ts}				6.12		

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_F	$I_F=75\text{A}$		1.75	2.20	V
		$I_F=75\text{A}, T_j=125^\circ\text{C}$		1.65		
		$I_F=75\text{A}, T_j=150^\circ\text{C}$		1.60		
Reverse Recovery Current	I_{rr}	$I_F=75\text{A}, V_R=400\text{V}, -di/dt=440\text{A/us}$		10		A
Reverse Recovery Charge	Q_{rr}			0.98		μC
Diode reverse recovery time	t_{rr}			160		ns
Reverse recovery energy	E_{rec}			0.14		mJ
Reverse Recovery Current	I_{rr}	$I_F=75\text{A}, V_R=400\text{V}, -di/dt=440\text{A/us}, T_j=125^\circ\text{C}$		17		A
Reverse Recovery Charge	Q_{rr}			2.97		μC
Diode reverse recovery time	t_r			188		ns
Reverse recovery energy	E_{rec}			0.47		mJ
Reverse Recovery Current	I_{rr}	$I_F=75\text{A}, V_R=400\text{V}, -di/dt=440\text{A/us}, T_j=150^\circ\text{C}$		20		A
Reverse Recovery Charge	Q_{rr}			3.26		μC
Diode reverse recovery time	t_r			212		ns
Reverse recovery energy	E_{rec}			0.54		mJ

Typical Characteristics

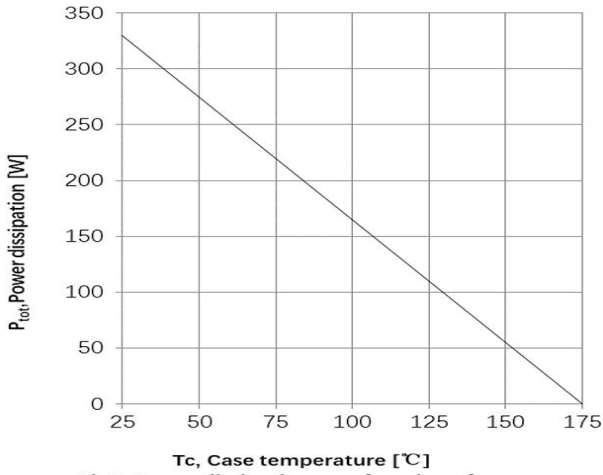


Fig1. Power dissipation as a function of case temperature ($T_j \leq 175^\circ\text{C}$)

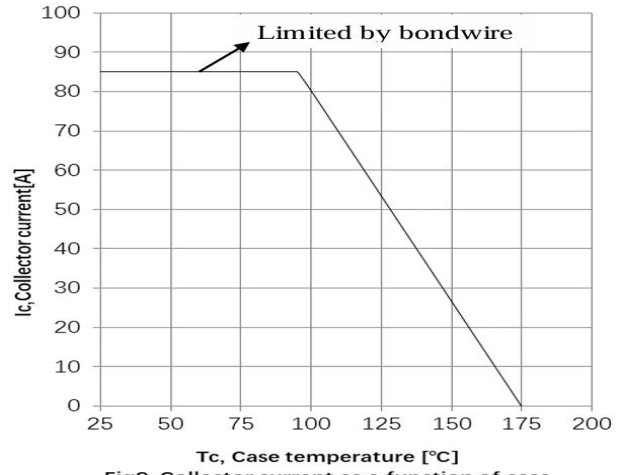


Fig2. Collector current as a function of case temperature ($V_{ge} \geq 15\text{V}$, $T_j \leq 175^\circ\text{C}$)

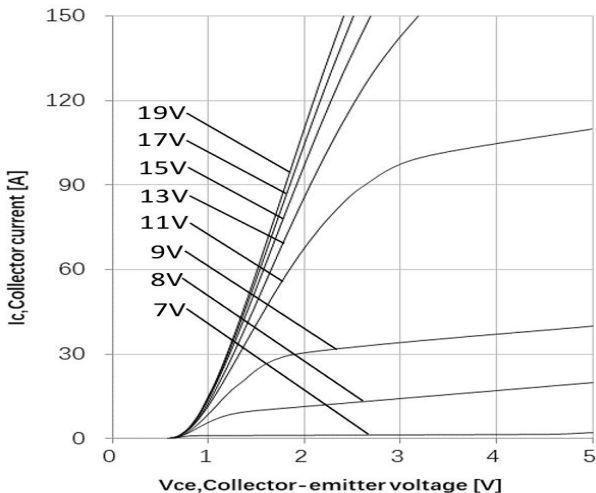


Fig3. Typical output characteristic ($T_j = 25^\circ\text{C}$)

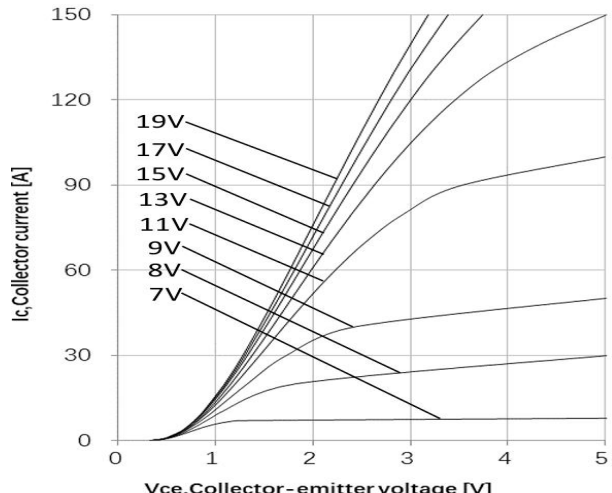


Fig4. Typical output characteristic ($T_j = 150^\circ\text{C}$)

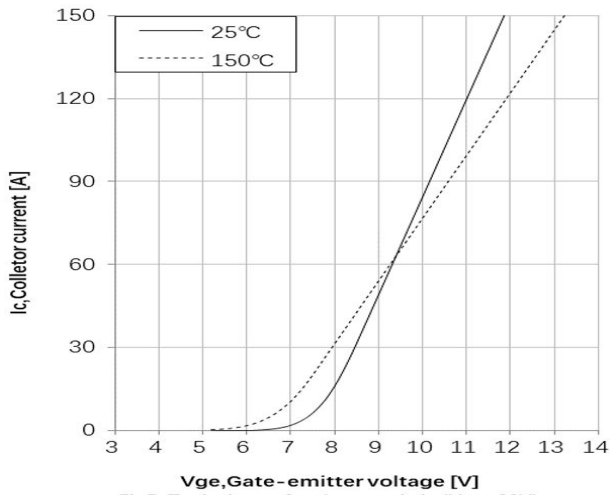


Fig5. Typical transfer characteristic ($V_{ce} = 20\text{V}$)

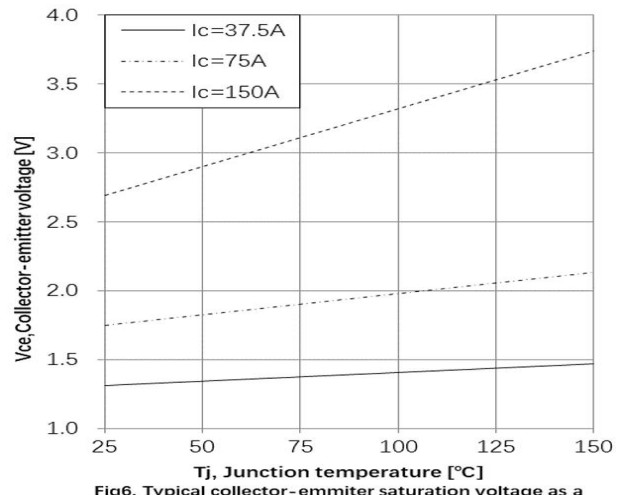


Fig6. Typical collector-emitter saturation voltage as a function of junction temperature ($V_{ge} = 15\text{V}$)

Typical Characteristics

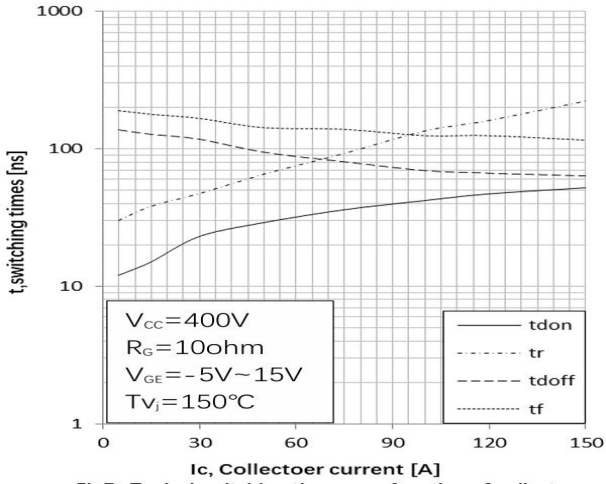


Fig7. Typical switching times as a function of collector current

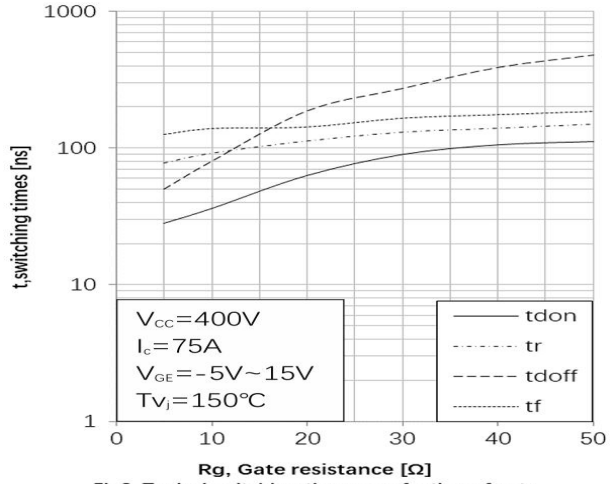


Fig8. Typical switching times as a function of gate resistance

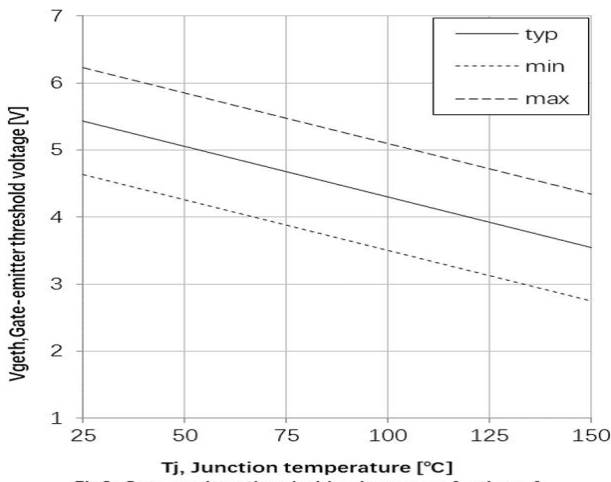


Fig9. Gate-emitter threshold voltage as a function of junction temperature ($I_c=0.75mA$)

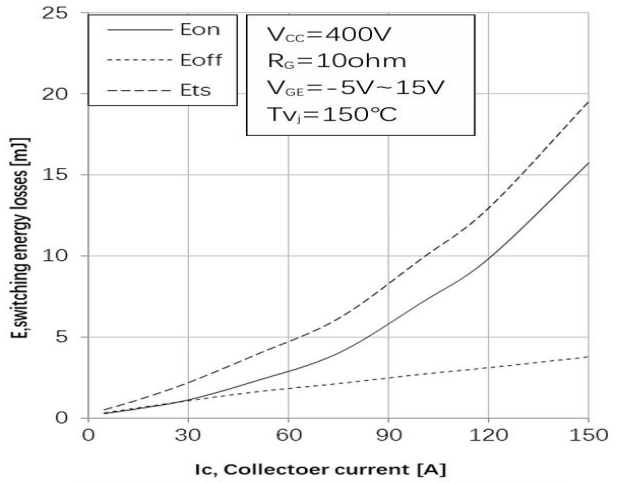


Fig10. Typical switching energy losses as a function of collector current

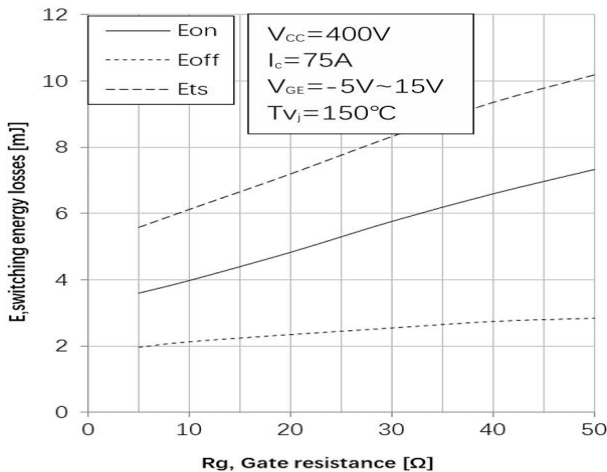


Fig11. Typical switching energy losses as a function of gate resistance

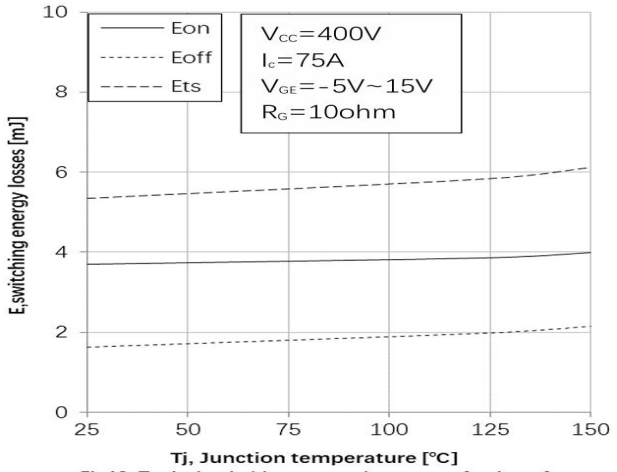


Fig12. Typical switching energy losses as a function of junction temperature

Typical Characteristics

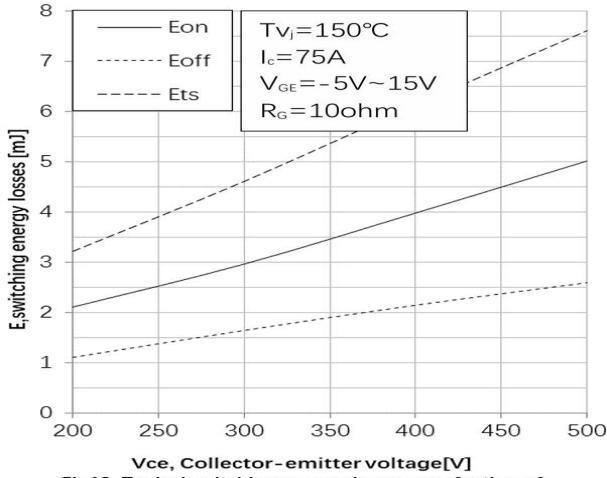


Fig13. Typical switching energy losses as a function of collector-emitter voltage

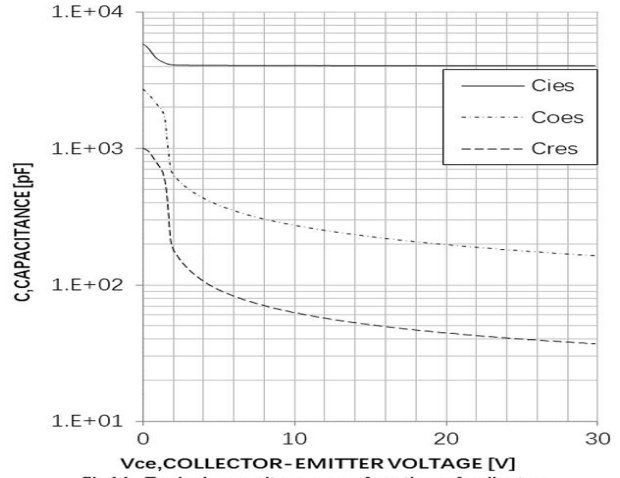


Fig14. Typical capacitance as a function of collector-emitter voltage

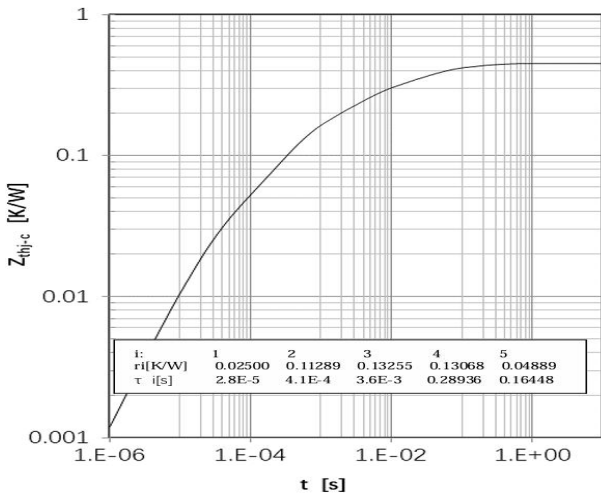


Fig 15. IGBT Transient Thermal Impedance

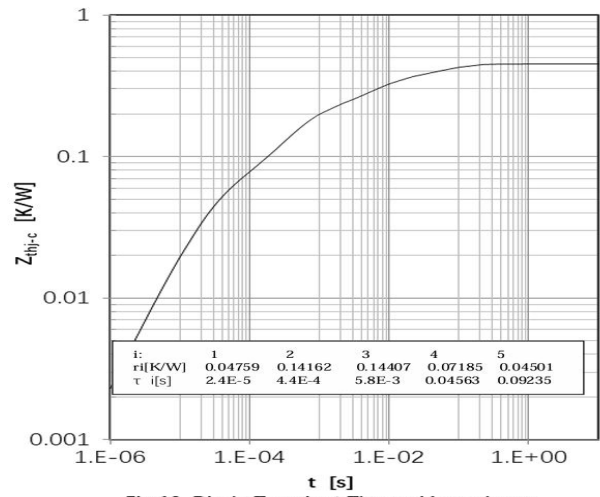


Fig 16. Diode Transient Thermal Impedance

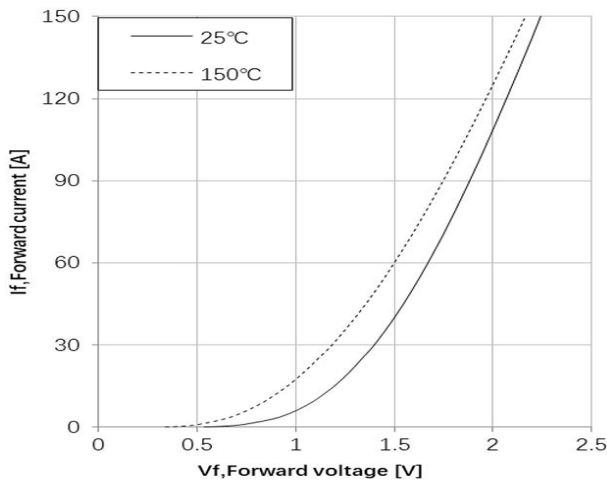


Fig17. Diode forward current as a function of forward voltage

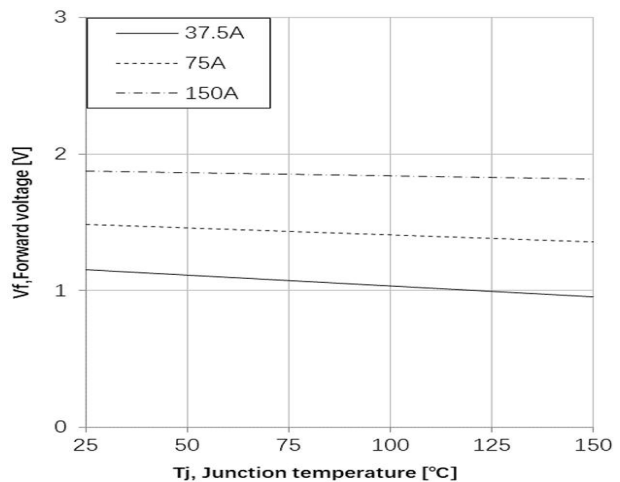
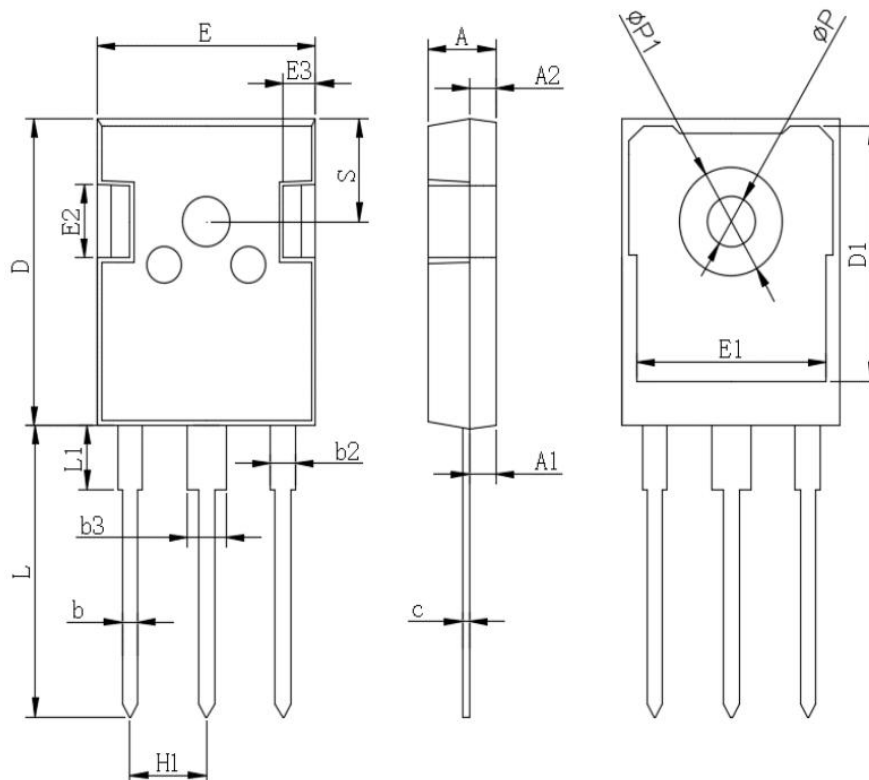


Fig18. Diode forward voltage as a function of junction temperature

TO-247AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.200	0.189	0.205
A1	2.210	2.610	0.087	0.103
A2	1.850	2.150	0.073	0.085
b	1.000	1.400	0.039	0.055
b2	1.910	2.210	0.075	0.087
b3	2.800	3.200	0.110	0.126
C	0.500	0.700	0.020	0.028
D	20.700	21.300	0.815	0.839
D1	16.250	16.850	0.640	0.663
E	15.500	16.100	0.610	0.634
E1	13.000	13.600	0.512	0.535
E2	4.800	5.200	0.189	0.205
E3	2.300	2.700	0.091	0.106
L	19.620	20.220	0.772	0.796
L1	-	4.300	-	0.169
ϕP	3.400	3.800	0.134	0.150
$\phi P1$	-	7.300	-	0.287
S	6.150 TYP		0.242 TYP	
H1	5.440 TYP		0.214 TYP	