

Product Summary

$V_{(BR)CES}$	$V_{CE(SAT)MAX}$	$I_c(100^\circ C)$
650V	1.95V@15V	40A

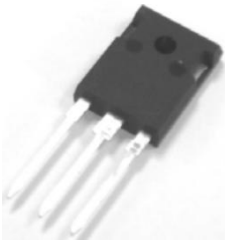
Feature

- Low switching losses
- Positive temperature coefficient
- High ruggedness, temperature stable

Application

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Package

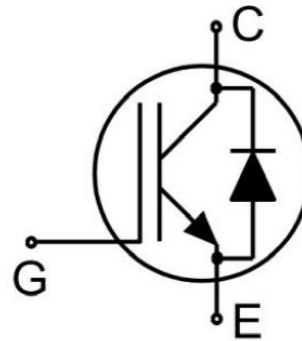


TO-247AB

Marking



Circuit diagram



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

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEs}	650	V
Continuous Gate- Emitter Voltage	V _{GES}	±20	V
Collector Current	I _c	80	A
Collector Current(T _c =100°C)	I _c (100°C)	40	A
Pulsed Collector Current, tp limited by T _{jmax} ,V _{GE} =15V	I _{CM}	160	A
Diode Continuous Forward Current	I _F	80	A
Diode Continuous Forward Current(T _c =100°C)	I _F (100°C)	40	A
Diode Forward Pulsed Current,tp limited by T _{jmax}	I _{Fpuls}	160	A
Turn off Safe Operating Area V _{CE} ≤650V,T _J ≤150°C	-	160	A
Power Dissipation(T _J =175°C)	P _D	187	W
Thermal Resistance, Junction to case for Diode	R _{θJC}	1.05	°C/W
Thermal Resistance, Junction to case for IGBT	R _{θJC}	0.80	°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} =250uA	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			4	
Gate to Emitter Leakage Current	I _{GES}	V _{GE} =±20V, V _{CE} = 0V			100	nA
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V,I _c =40A		1.55	1.95	V
		V _{GE} =15V,I _c =40A,T _J =125°C		1.75		
		V _{GE} =15V,I _c =40A,T _J =150°C		1.85		
Gate Threshold Voltage	V _{GE(th)}	V _{CE} =V _{GE} ,I _c =1mA	4.7	5.5	6.3	V
Dynamic characteristics						
Input Capacitance	C _{ies}	V _{CE} =25V,V _{GE} =0V, f =1MHz		2.18		nF
Reverse Transfer Capacitance	C _{res}			0.03		
Total Gate Charge	Q _g	V _{CC} =300V,V _{GE} =15V,I _c =40A		0.20		uC
Turn-on delay time	t _{d(on)}	V _{CC} =300V,V _{GE} = -5V~15V, I _c =40A,R _G =20Ω,		19		nS
Turn-on rise time	t _r			65		
Turn-off delay time	t _{d(off)}			129		
Turn-off fall time	t _f			48		
Turn-on Switching Energy	E _{on}			1.27		
Turn-off Switching Energy	E _{off}		0.46			
Turn-on delay time	t _{d(on)}	V _{CC} =300V,V _{GE} = -5V~15V, I _c =40A,R _G =20Ω,T _J =125°C		18		nS
Turn-on rise time	t _r			63		
Turn-off delay time	t _{d(off)}			137		
Turn-off fall time	t _f			79		
Turn-on Switching Energy	E _{on}			1.29		
Turn-off Switching Energy	E _{off}		0.57			
Turn-on delay time	t _{d(on)}	V _{CC} =300V,V _{GE} = -5V~15V, I _c =40A,R _G =20Ω,T _J =150°C		18		nS
Turn-on rise time	t _r			61		
Turn-off delay time	t _{d(off)}			140		
Turn-off fall time	t _f			91		
Turn-on Switching Energy	E _{on}			1.31		
Turn-off Switching Energy	E _{off}		0.61			

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	$I_F=40\text{A}$		1.50	1.90	V
		$I_F=40\text{A}, T_j=125^\circ\text{C}$		1.40		
		$I_F=40\text{A}, T_j=150^\circ\text{C}$		1.35		
Reverse Recovery Current	I_{rr}	$I_F=40\text{A}, V_R=400\text{V}, -di/dt=450\text{A}/\mu\text{s}, T_j=25^\circ\text{C}$		15		A
Diode reverse recovery time	t_{rr}			133		ns
Reverse Recovery Charge	Q_{rr}			1.38		μC
Reverse recovery energy	E_{rec}			0.23		mJ
Reverse Recovery Current	I_{rr}	$I_F=40\text{A}, V_R=400\text{V}, -di/dt=450\text{A}/\mu\text{s}, T_j=125^\circ\text{C}$		21		A
Diode reverse recovery time	t_{rr}			171		ns
Reverse Recovery Charge	Q_{rr}			2.36		μC
Reverse recovery energy	E_{rec}			0.58		mJ
Reverse Recovery Current	I_{rr}	$I_F=40\text{A}, V_R=400\text{V}, -di/dt=450\text{A}/\mu\text{s}, T_j=150^\circ\text{C}$		24		A
Diode reverse recovery time	t_{rr}			205		ns
Reverse Recovery Charge	Q_{rr}			3.32		μC
Reverse recovery energy	E_{rec}			0.69		mJ

Typical Characteristics

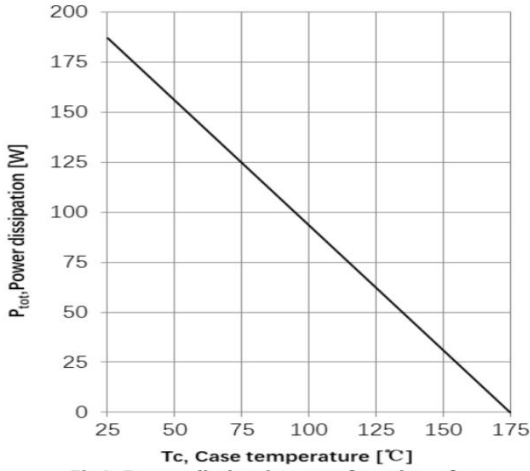


Fig1. Power dissipation as a function of case temperature ($T_j \leq 175^\circ\text{C}$)

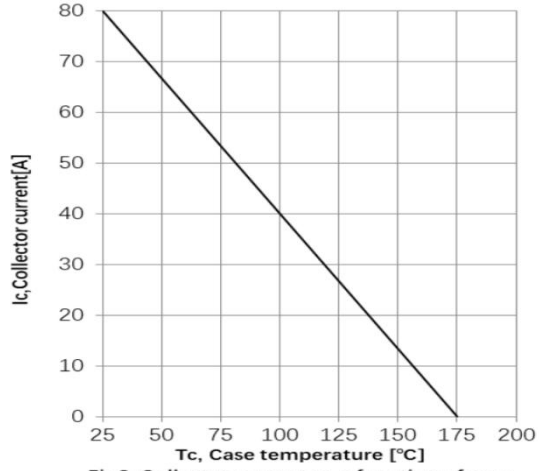


Fig2. Collector current as a function of case temperature ($V_{ge} \geq 15\text{V}$, $T_j \leq 175^\circ\text{C}$)

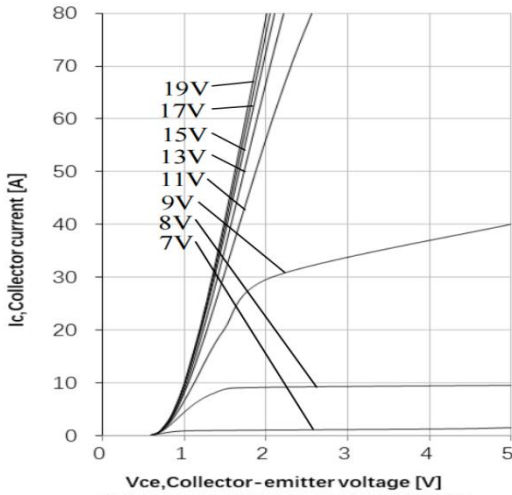


Fig3. Typical output characteristic ($T_j = 25^\circ\text{C}$)

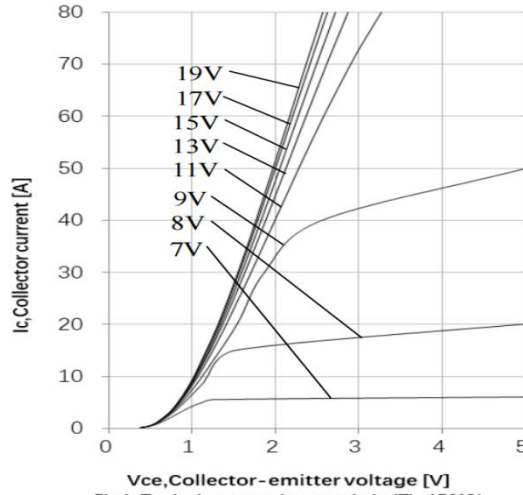


Fig4. Typical output characteristic ($T_j = 150^\circ\text{C}$)

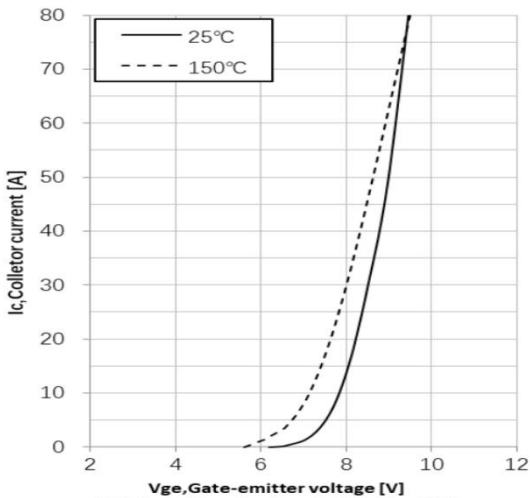


Fig5. Typical transfer characteristic ($V_{ce} = 20\text{V}$)

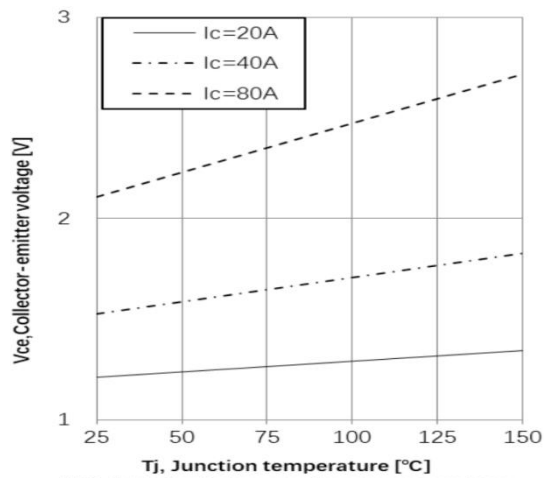
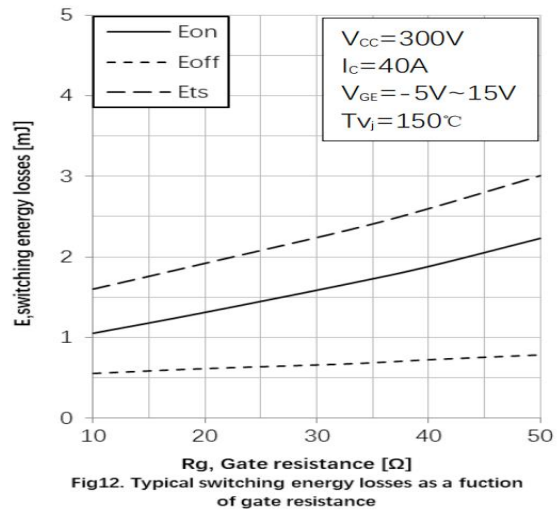
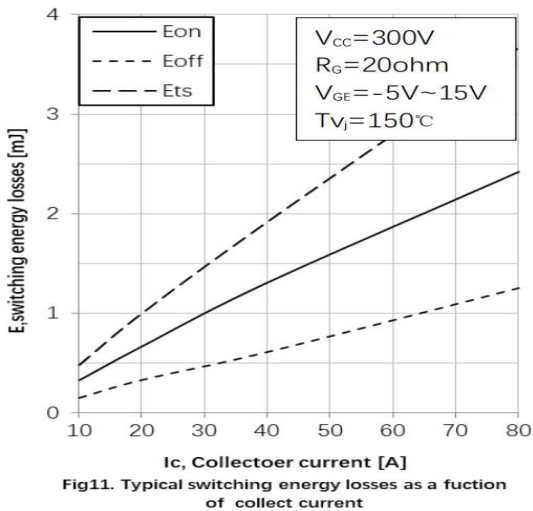
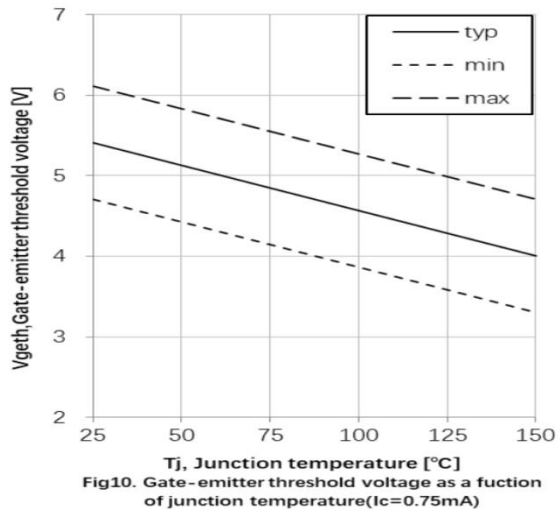
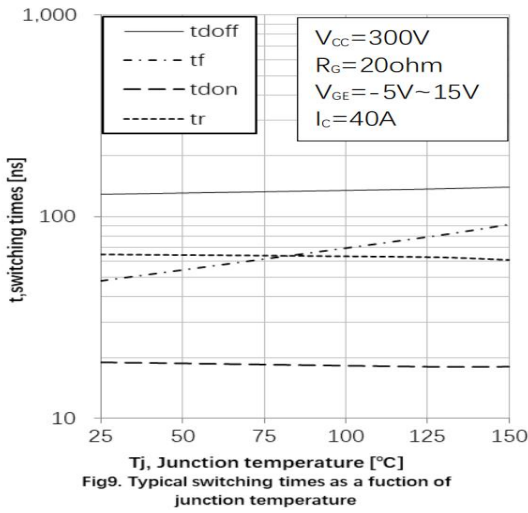
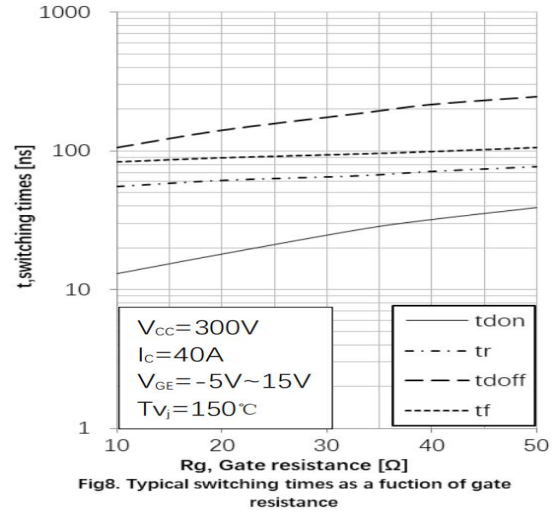
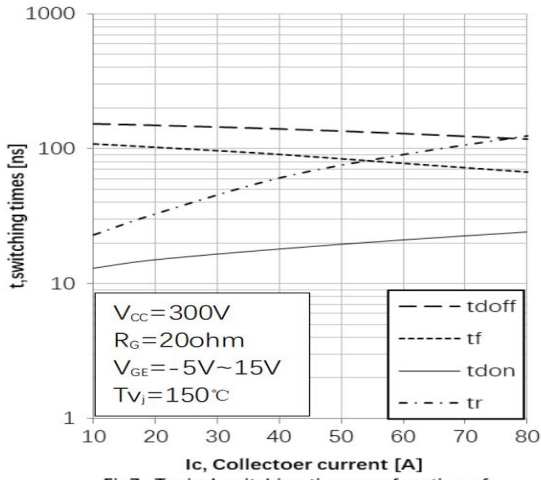
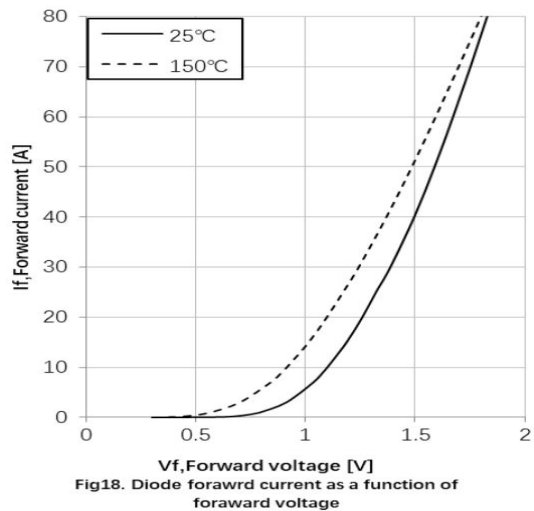
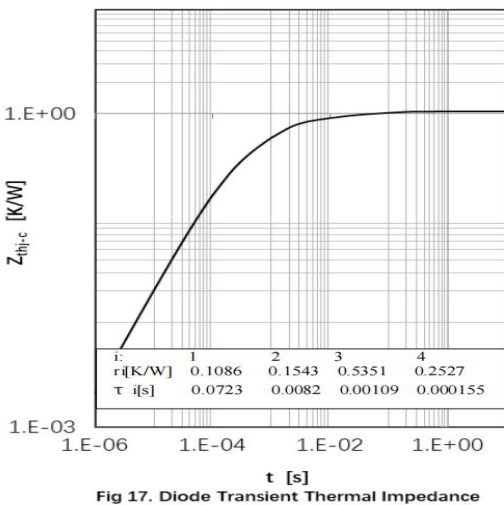
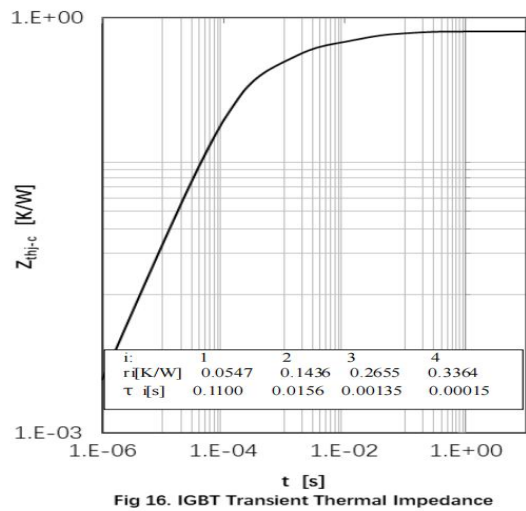
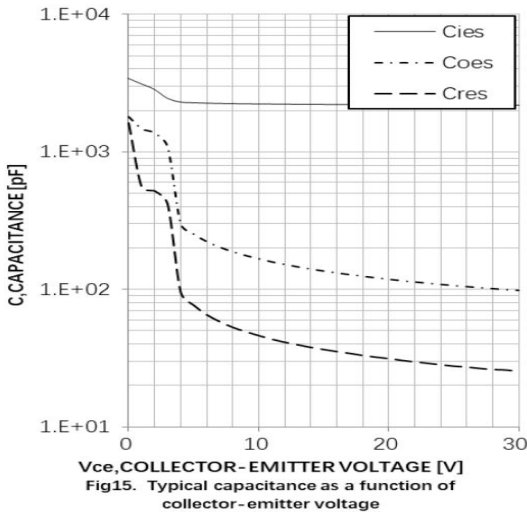
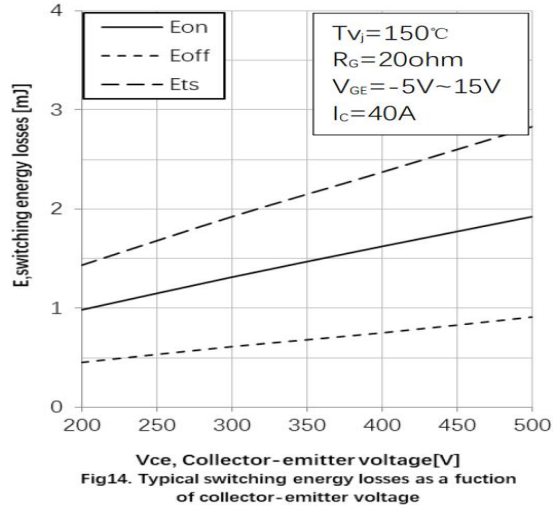
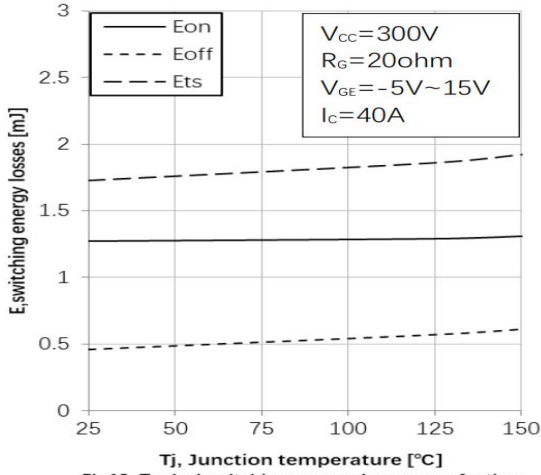


Fig6. Typical collector-emitter saturation voltage as a function of junction temperature ($V_{ge} = 15\text{V}$)

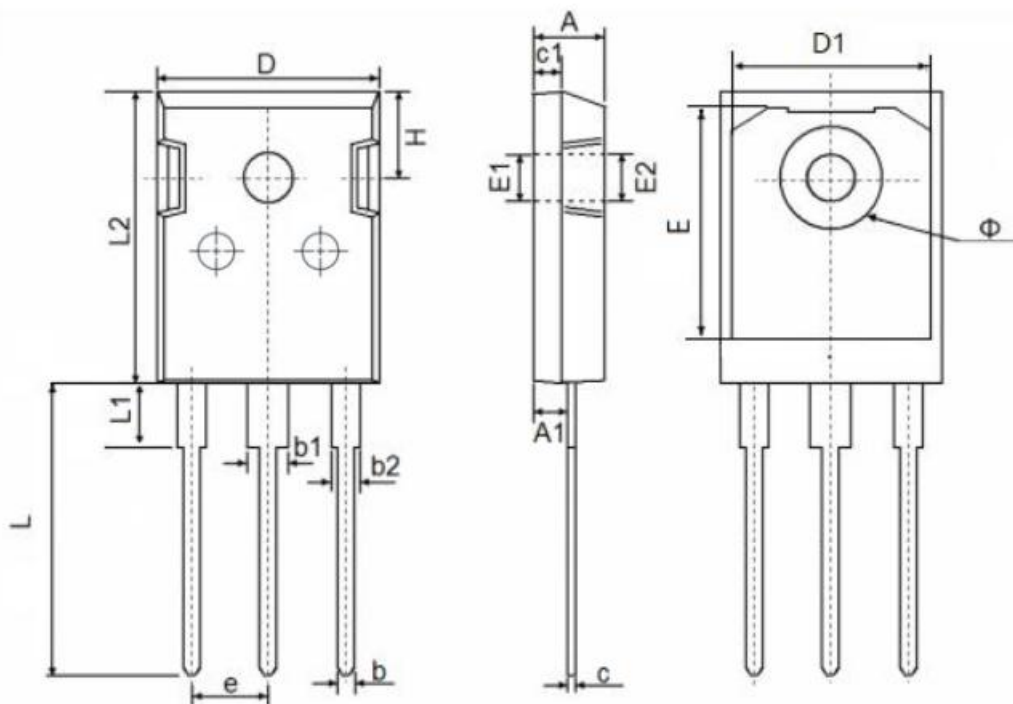
Typical Characteristics



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TO-247AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.250	0.189	0.207
A1	2.100	2.600	0.083	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.400	0.110	0.134
b2	1.800	2.420	0.071	0.095
c	0.500	0.700	0.020	0.028
c1	1.500	2.500	0.059	0.098
D	15.500	16.200	0.610	0.638
D1	13.000	14.200	0.512	0.559
E	16.250	17.650	0.640	0.695
E1	3.650	5.500	0.144	0.220
E2	3.650	5.500	0.144	0.220
L	19.400	20.400	0.764	0.803
L1	3.900	4.500	0.154	0.177
L2	20.800	21.300	0.819	0.836
φ	7.190 REF.		0.283 REF.	
e	5.440 BSC		0.214 BSC	
H	5.300	6.300	0.209	0.248