

Product Summary

$V_{(BR)CES}$	$V_{CE(SAT)MAX}$	$I_C(100^{\circ}C)$
650V	1.95V@15V	30A

Feature

- Low switching losses
- Positive temperature coefficient
- High ruggedness, temperature stable
- High short circuit capability

Application

- AC and DC servo drive amplifier
- Uninterruptible power supply
- Motion/servo control

Package

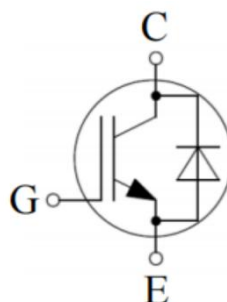


TO-263AB

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	40	A
Collector Current($T_C = 100^\circ\text{C}$)	$I_C(100^\circ\text{C})$	30	A
Pulsed Collector Current, tp limited by T_{jmax} , $V_{GE}=15\text{V}$	I_{CM}	60	A
Diode Continuous Forward Current	I_F	40	A
Diode Continuous Forward Current($T_C = 100^\circ\text{C}$)	$I_F(100^\circ\text{C})$	30	A
Diode Forward Current, tp limited by T_{jmax}	I_{Fpuls}	60	A
Turn off Safe Operating Area $V_{CE} \leq 650\text{V}, T_J \leq 150^\circ\text{C}$	-	60	A
Short circuit withstand time $V_{GE}=15\text{V}, V_{CC}=400\text{V}, V_{CEM} \leq 650\text{V}$	T_{SC}	5	μs
Power Dissipation($T_J=175^\circ\text{C}$)	P_D	136	W
Thermal Resistance, Junction to case for Diode	$R_{\theta JC}$	1.8	$^\circ\text{C/W}$
Thermal Resistance, Junction to case for IGBT	$R_{\theta JC}$	1.1	$^\circ\text{C/W}$
Soldering Temperature, wave soldering 1.6mm(0.063in.) from case for 10s	T_L	260	$^\circ\text{C}$
Junction Temperature	T_J	$-40 \sim +175$	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^\circ\text{C}$

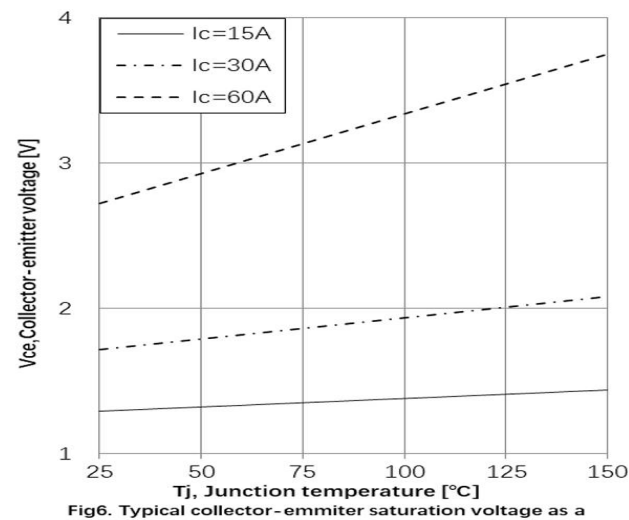
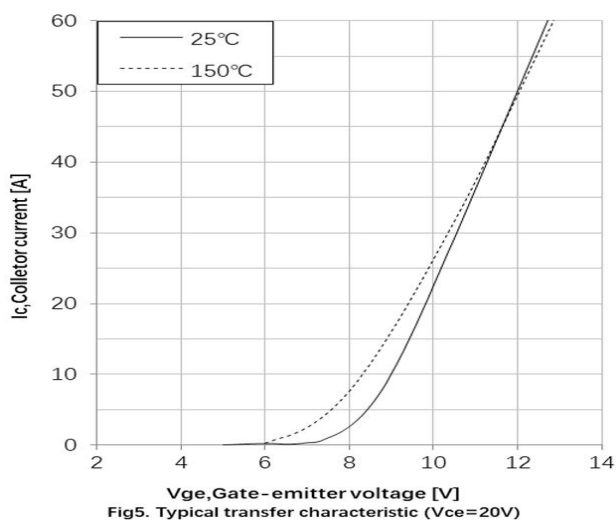
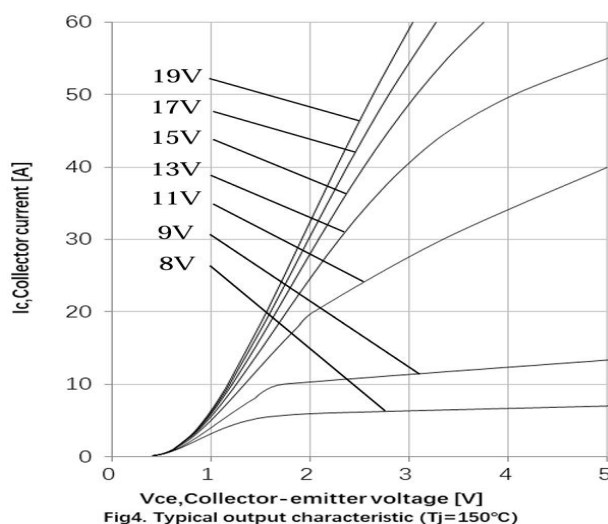
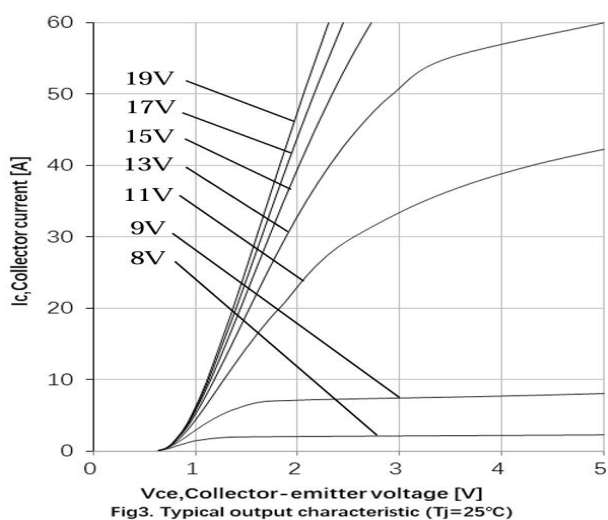
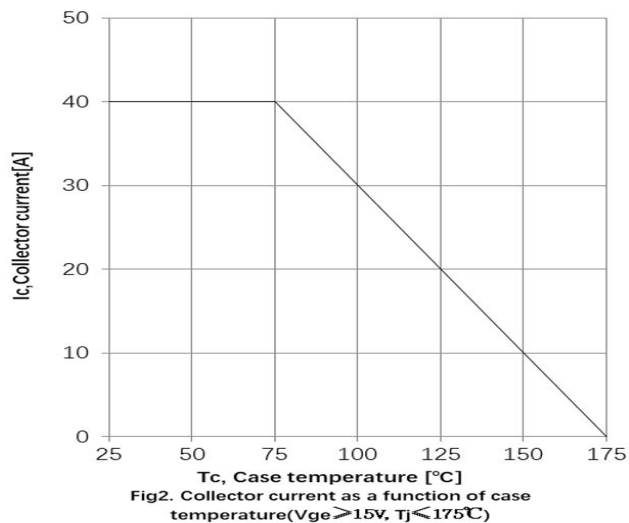
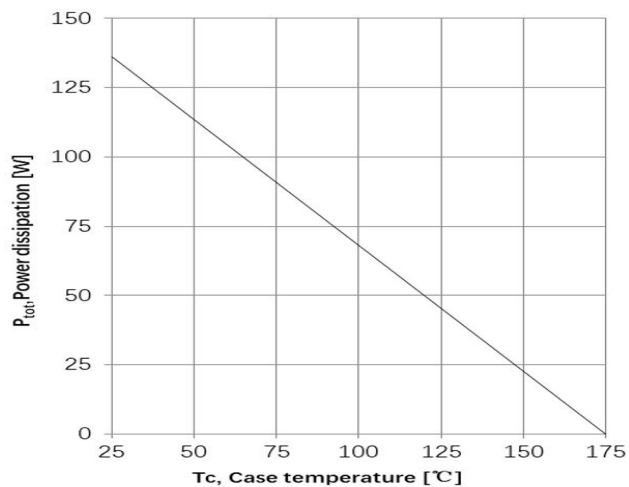
Electrical characteristics of the IGBT ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE} = 0\text{V}, I_C=250\mu\text{A}$	650			V
Collector-Emitter Leakage Current	I_{CES}	$V_{GE} = 0\text{V}, V_{CE}=650\text{V}$			0.25	mA
		$V_{GE} = 0\text{V}, V_{CE}=650\text{V}, T_J=150^\circ\text{C}$			4	
Gate to Emitter Leakage Current	I_{GES}	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$			100	nA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15\text{V}, I_C=30\text{A},$		1.65	1.95	V
		$V_{GE}=15\text{V}, I_C=30\text{A}, T_J=125^\circ\text{C}$		2.0		
		$V_{GE}=15\text{V}, I_C=30\text{A}, T_J=150^\circ\text{C}$		2.1		
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C=1\text{mA}$	4.7	5.5	6.2	V
Dynamic characteristics						
Input Capacitance	C_{ies}	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f = 1\text{MHz}$		1.53		nF
Reverse Transfer Capacitance	C_{res}			0.04		
Total Gate Charge	Q_g	$V_{CC}=480\text{V}, V_{GE} = 15\text{V}, I_C=30\text{A}$		0.16		μC
Short Circuit Collector Current	$I_{C(SC)}$	$V_{CC}=400\text{V}, V_{GE}=15\text{V},$ $t_{SC} \leq 5\mu\text{s}, T_J \leq 150^\circ\text{C}$		130		A
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400\text{V}, V_{GE}=-5\text{V} \sim 15\text{V},$ $I_C = 30\text{A}, R_G=20\Omega$		58		nS
Turn-on rise time	t_r			76		
Turn-off delay time	$t_{d(off)}$			93		
Turn-off fall time	t_f			88		
Turn-on Switching Energy	E_{on}			1.37		
Turn-off Switching Energy	E_{off}			0.63		mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400\text{V}, V_{GE}=-5\text{V} \sim 15\text{V},$ $I_C = 30\text{A}, R_G=20\Omega, T_J=125^\circ\text{C}$		56		nS
Turn-on rise time	t_r			77		
Turn-off delay time	$t_{d(off)}$			99		
Turn-off fall time	t_f			116		
Turn-on Switching Energy	E_{on}			1.42		
Turn-off Switching Energy	E_{off}			0.79		mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400\text{V}, V_{GE}=-5\text{V} \times q \sim 15\text{V},$ $I_C = 30\text{A}, R_G=20\Omega, T_J=150^\circ\text{C}$		54		nS
Turn-on rise time	t_r			77		
Turn-off delay time	$t_{d(off)}$			102		
Turn-off fall time	t_f			128		
Turn-on Switching Energy	E_{on}			1.45		
Turn-off Switching Energy	E_{off}			0.85		mJ

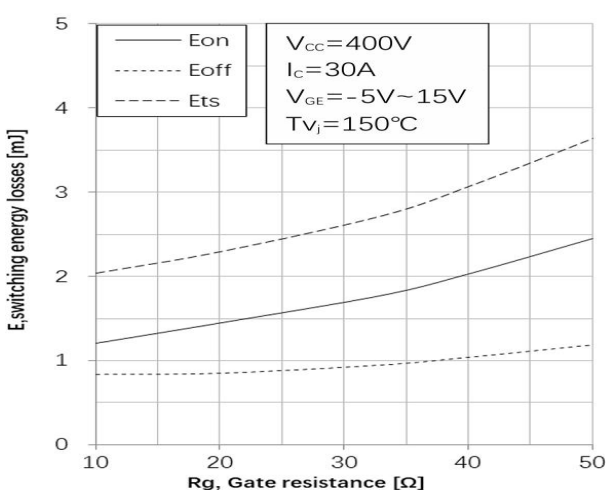
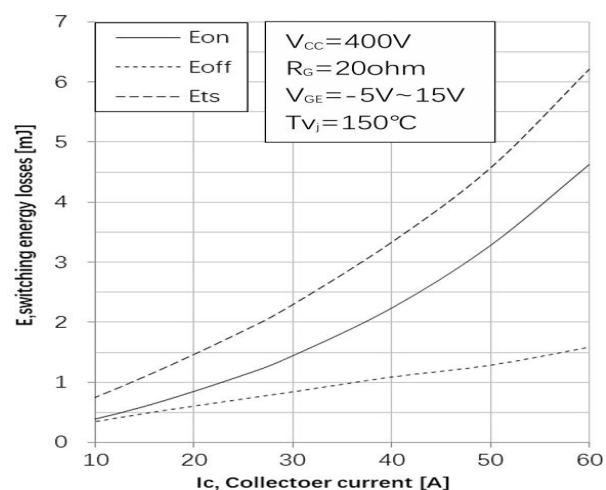
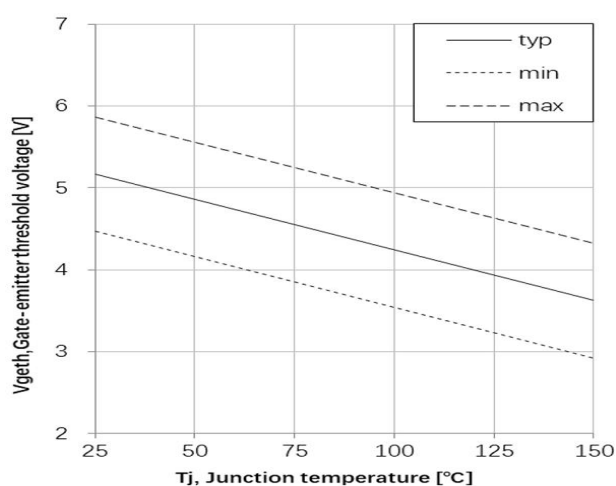
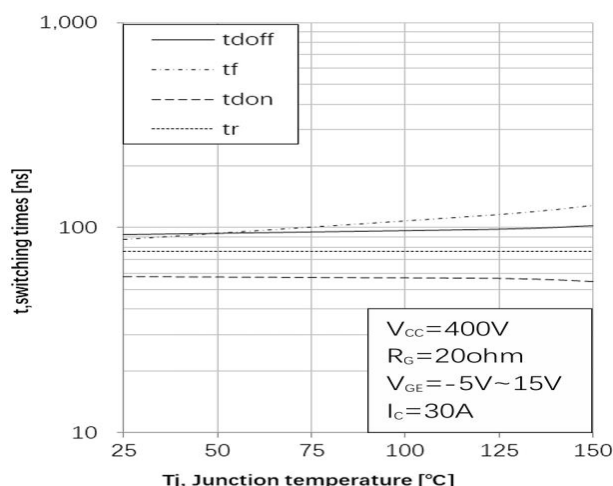
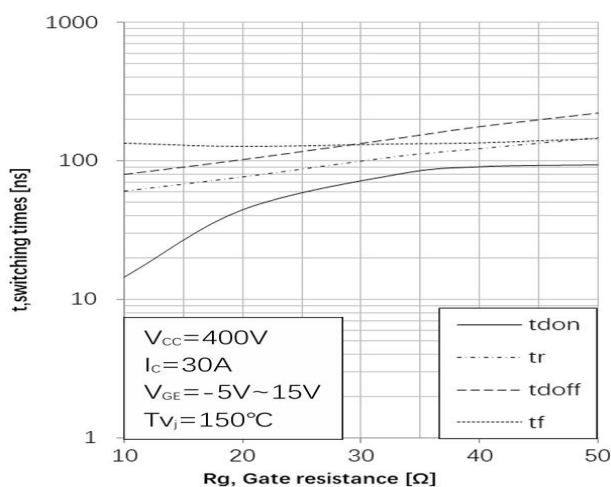
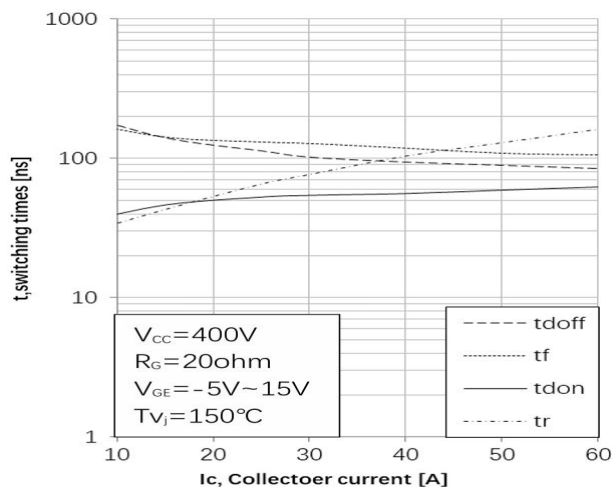
Electrical characteristics of the Diode ($T_j=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_F	$I_F=30\text{A}$		1.6	2	V
		$I_F=30\text{A}, T_j=125^{\circ}\text{C}$		1.55		
		$I_F=30\text{A}, T_j=150^{\circ}\text{C}$		1.5		
Reverse Recovery Current	I_{rr}	$I_F=30\text{A}, V_R=400\text{V},$ $di/dt=-320\text{A}/\mu\text{s}$		11		A
Reverse Recovery Charge	Q_{rr}			0.75		μC
Diode Reverse Recovery Time	t_{rr}			114		ns
Reverse Recovery Energy	E_{rec}			0.14		mJ
Reverse Recovery Current	I_{rr}	$I_F=30\text{A}, V_R=400\text{V},$ $di/dt=-320\text{A}/\mu\text{s}, T_j=125^{\circ}\text{C}$		14		A
Reverse Recovery Charge	Q_{rr}			1.14		μC
Diode Reverse Recovery Time	t_{rr}			156		ns
Reverse Recovery Energy	E_{rec}			0.27		mJ
Reverse Recovery Current	I_{rr}	$I_F=30\text{A}, V_R=400\text{V},$ $di/dt=-320\text{A}/\mu\text{s}, T_j=150^{\circ}\text{C}$		16		A
Reverse Recovery Charge	Q_{rr}			1.59		μC
Diode Reverse Recovery Time	t_{rr}			177		ns
Reverse Recovery Energy	E_{rec}			0.34		mJ

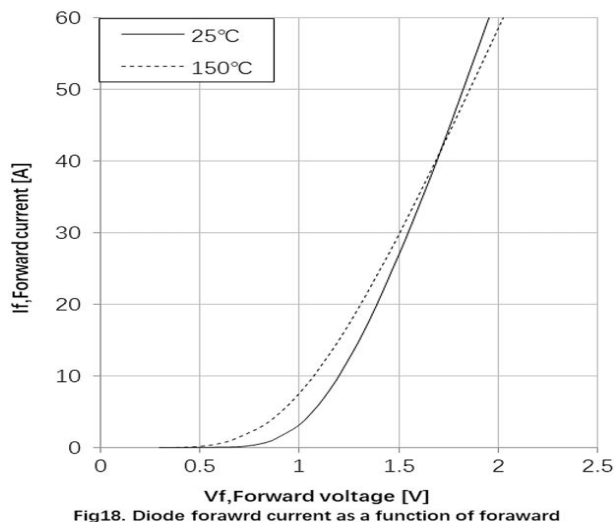
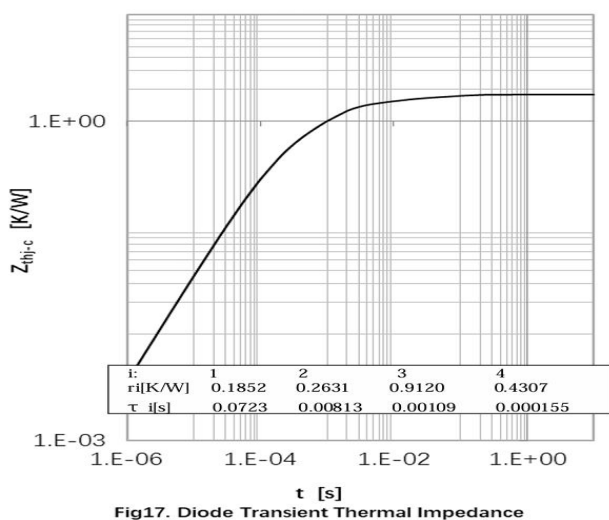
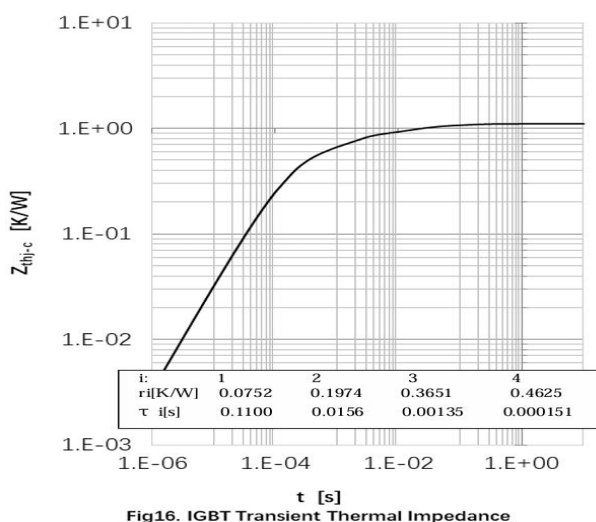
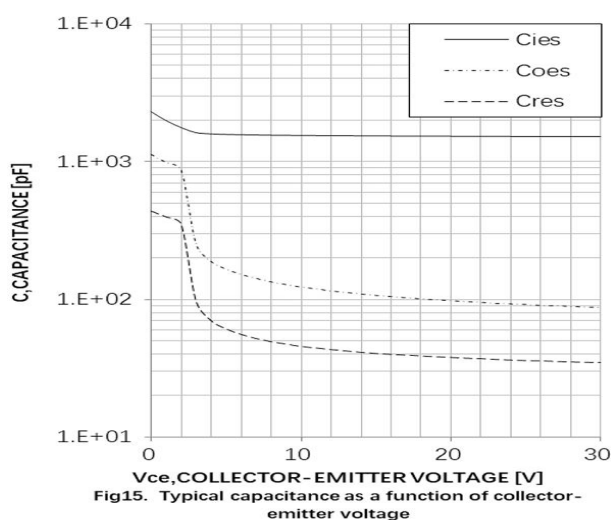
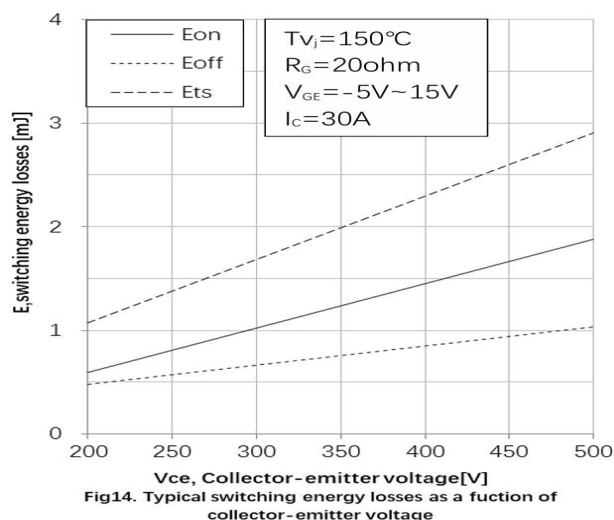
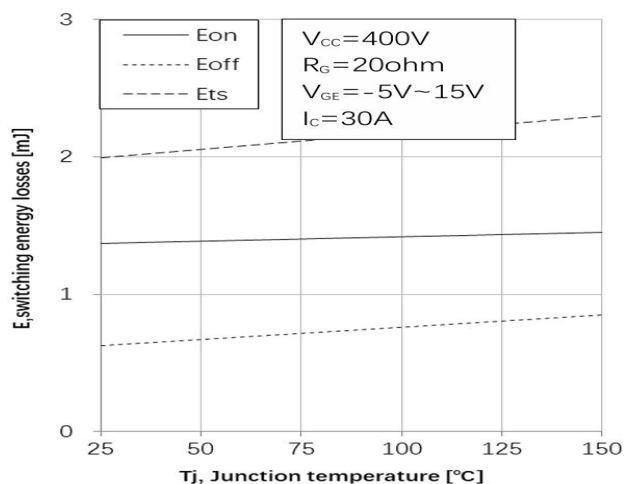
Typical Characteristics



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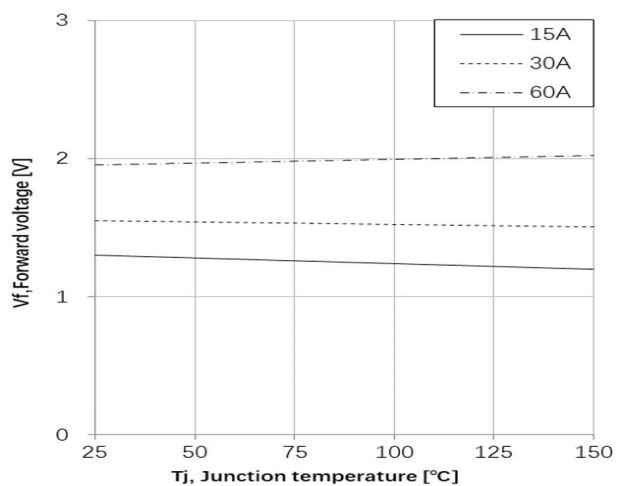
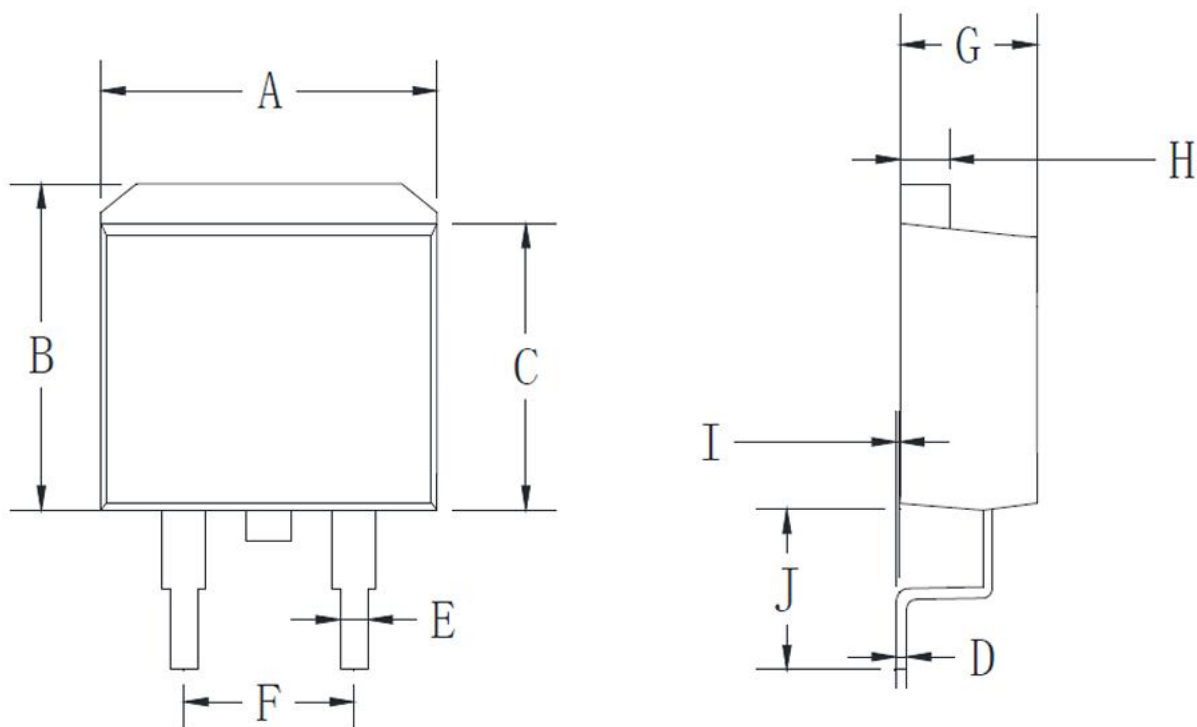


Fig19. Typical diode forward voltage as a function of junction temperature

TO-263AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.500	11.500	0.374	0.453
B	9.700	10.500	0.382	0.413
C	8.400	9.000	0.331	0.354
D	0.280	0.640	0.011	0.025
E	0.680	0.940	0.027	0.037
F	4.550	5.600	0.179	0.220
G	4.040	5.100	0.159	0.201
H	1.140	1.400	0.045	0.055
I	0.000	0.200	0.000	0.008
J	4.900	6.050	0.193	0.238