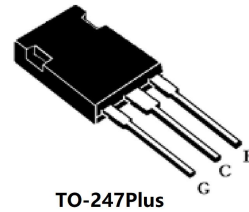


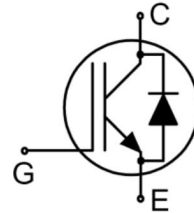
Features

- Very Low Saturation Voltage:
VCE(sat) = 2.1V @ IC = 160 A
- Maximum Junction Temperature: TJ = 175°C
- Positive Temperature Co-Efficient
- Tight Parameter Distribution
- High Input Impedance



Applications

- Traction Inverter for HEV/EV
- Auxiliary DC/AC Converter
- Motor Drives
- Other Power-Train Applications
Requiring High Power Switch



Absolute Ratings(Tc=25°C)

Parameter	Symbol	Value	Unit
Collector-Emmitter Voltage	V _{ces}	650	V
Collector Current-continuous	I _c T=25°C	240	A
	T=100°C	160	A
Diode forward current	I _F T=25°C	240	A
	T _C =100°C	160	A
Collector Current-pulse (note 1)	I _{CM}	480	A
Gate-EMMiter Voltage	V _{GES}	±30	V
Power Dissipation	PD T _C =25°C	882	W
	T _C =100°C	441	W
Operating and Storage Temperature Range	T _J , T _{STG}	-55~+175	°C
Short Circuit Withstand Time	t _{sc}	5	us
Maximum Lead Temperature for Soldering Purposes	T _L	300	°C

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emmitter Voltage	BV _{CES}	I _c =1mA, V _{GE} =0V	650	-	-	V

Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_C=25^{\circ}C$	-	-	40	μA
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=30V$	-	-	250	nA
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-30V$	-	-	-250	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=0.6mA$	3.5	5.0	6.5	V
Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=160A$	-	-	2.1	V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1.0MHz$	-	7500	-	pF
Output capacitance	C_{oes}		-	644	-	pF
Reverse transfer capacitance	C_{res}		-	150	-	pF

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_C=160A, R_G=5\Omega, V_{GE}=15V, \text{Inductive Load}, T_C=25^{\circ}C$	-	53	-	ns
Turn-On rise time	t_r		-	197	-	ns
Turn-Off delay time	$t_{d(off)}$		-	98	-	ns
Turn-Off Fall time	t_f		-	141	-	ns
Turn-on Loss	E_{on}		-	12.4	-	mJ
Turn-off Loss	E_{off}		-	5.7	-	mJ
Total Loss	E_{ts}		-	18.1	-	mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_C=160A, R_G=5\Omega, V_{GE}=15V, \text{Inductive Load}, T_C=175^{\circ}C$	-	52	-	ns
Turn-On rise time	t_r		-	236	-	ns
Turn-Off delay time	$t_{d(off)}$		-	104	-	ns
Turn-Off Fall time	t_f		-	204	-	ns
Turn-on switching Loss	E_{on}		-	21	-	mJ
Turn-off switching Loss	E_{off}		-	8.5	-	mJ
Total switching Loss	E_{ts}		-	29.5	-	mJ
Gate Charge	Q_g		-	235	-	nC

Gate to Emitter Charge	Q _{ge}	V _{CC} =400V, I _c =160A V _{GE} =15V	-	64	-	nC
Gate to Collector Charge	Q _{gc}		-	96	-	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _F	I _F =160A(T _J =25°C)	-	1.7		V
Diode Reverse recovery time	t _{rr}	I _F =160A di _F =/dt=200A/us T _J =25°C	-	132	-	ns
Diode Reverse recovery charge	Q _{rr}		-	3.3	-	μC

Thermal Characteristic

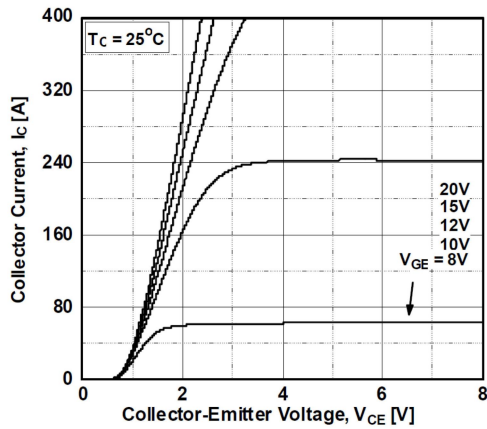
Paramer	Symbol	Max	Unit
Thermal Resistance, Junction to Case (IGBT)	R _{th(j-c)}	0.17	°C/W
Thermal Resistance, Junction to Case (Diode)	R _{th(j-c)}	0.32	°C/W
Thermal Resistance, Junction to Ambient	R _{th(j-A)}	40	°C/W

Notes:

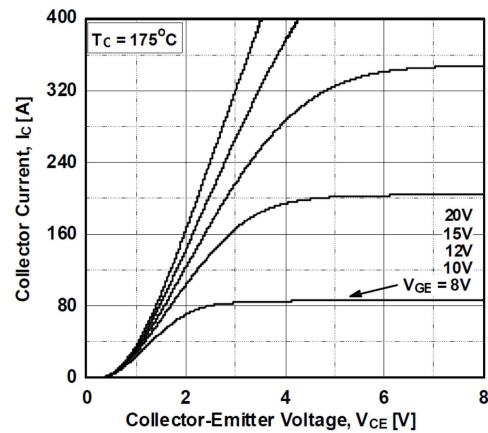
1. Repetitive Rating: Pulse width limited by maximum junction temperature

Electrical Characteristics (curves)

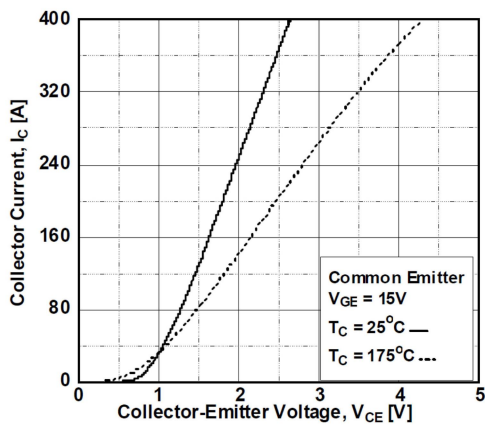
Typical Output Characteristics



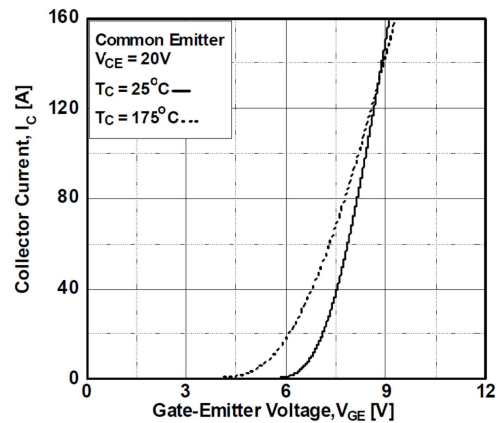
Typical Output Characteristics



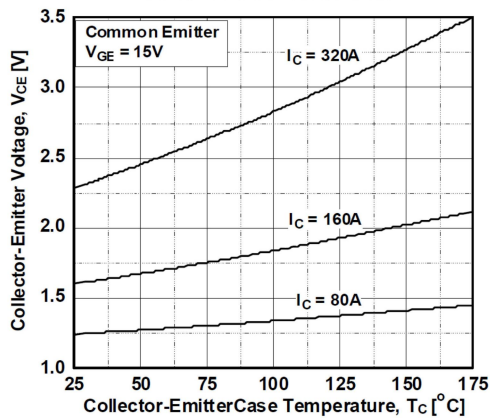
Typical Saturation Voltage Characteristics



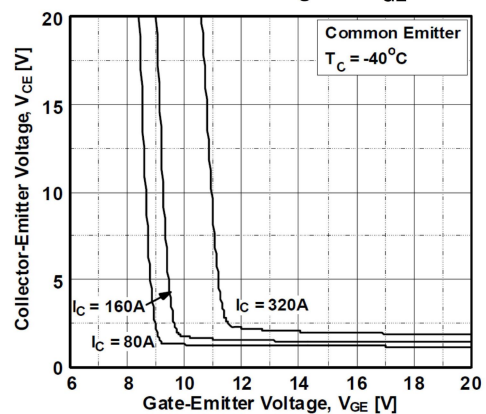
Transfer Characteristics



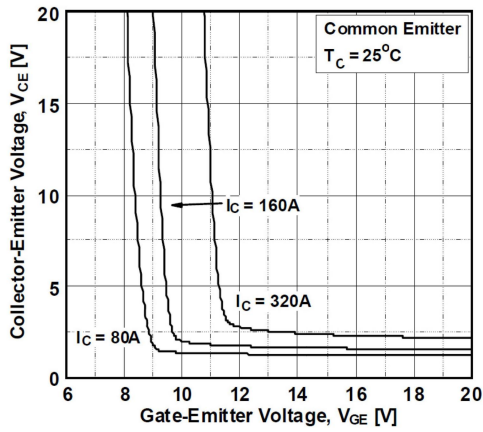
Saturation Voltage vs. Case Temperature at Variant Current Level



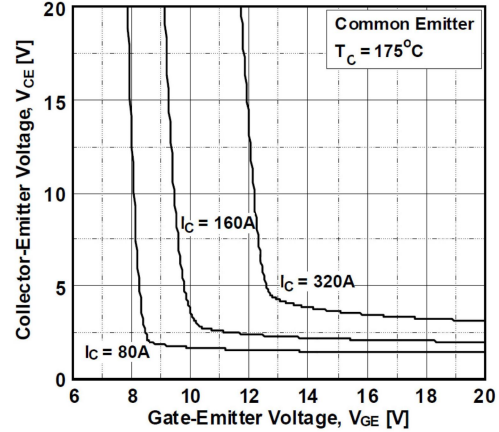
Saturation Voltage vs. V_{GE}



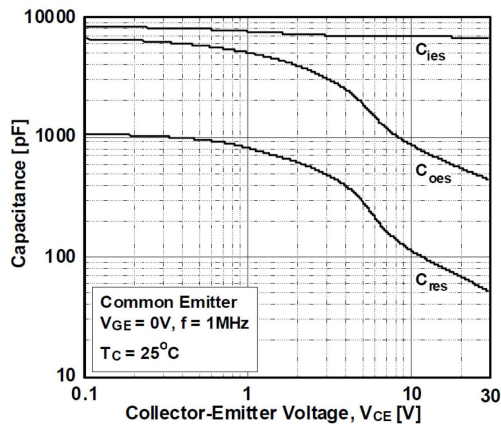
Saturation Voltage vs. V_{GE}



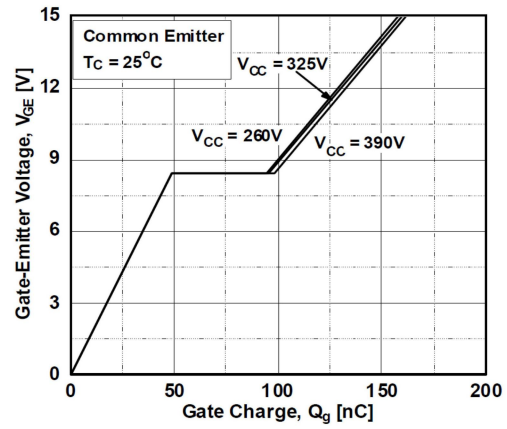
Saturation Voltage vs. V_{GE}



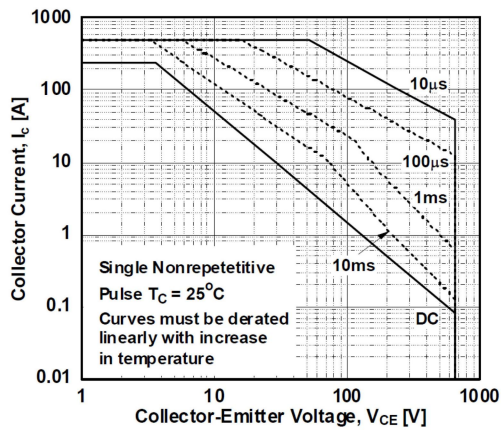
Capacitance Characteristics



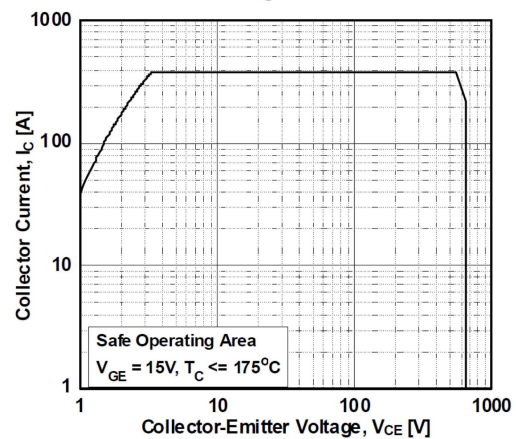
Gate Charge Characteristics



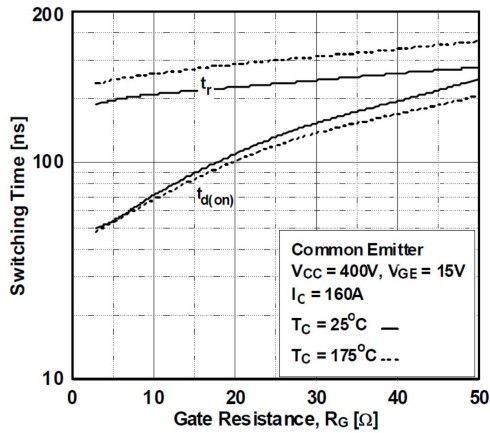
SOA Characteristics



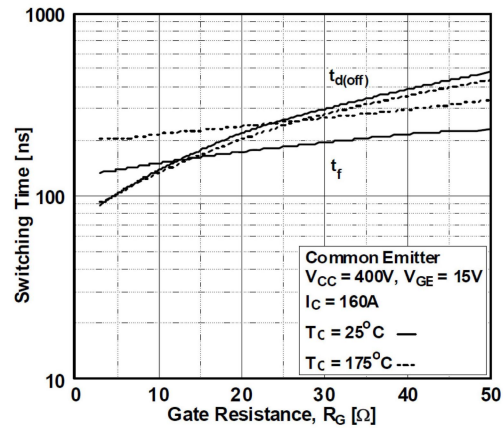
Turn Off Switching SOA Characteristics



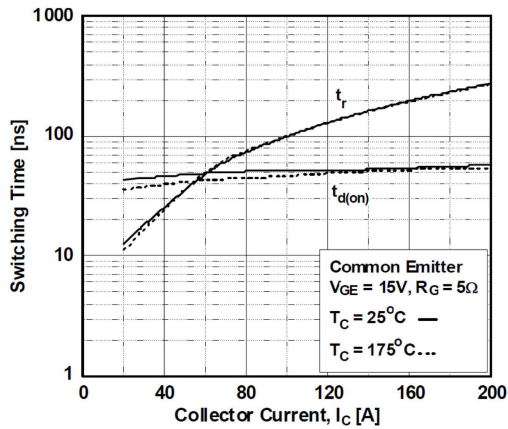
Turn-on Characteristics vs. Gate Resistance



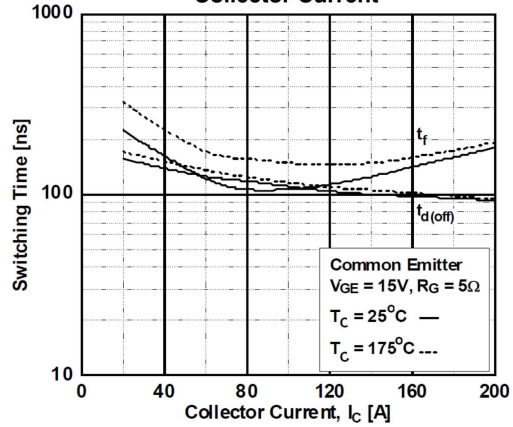
Turn-off Characteristics vs. Gate Resistance



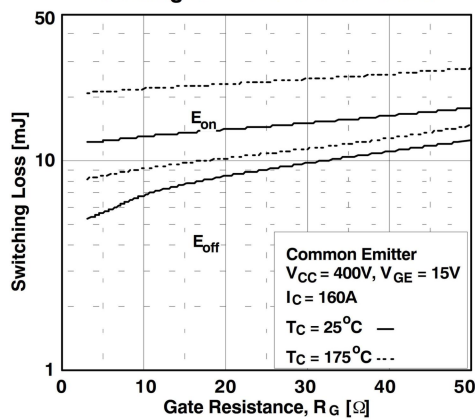
Turn-on Characteristics vs. Collector Current



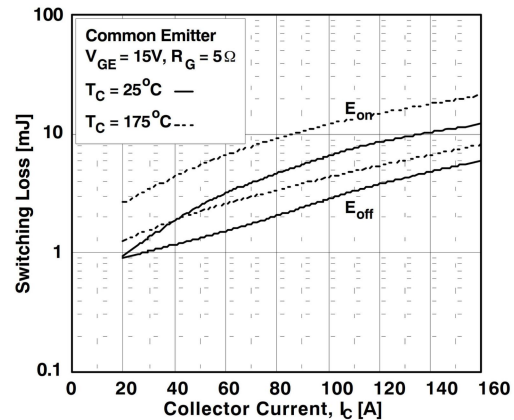
Turn-off Characteristics vs. Collector Current



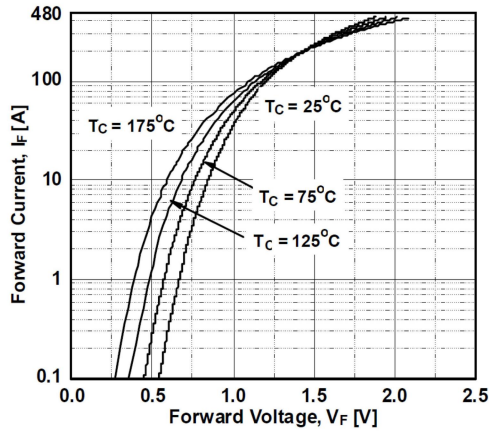
Switching Loss vs. Gate Resistance



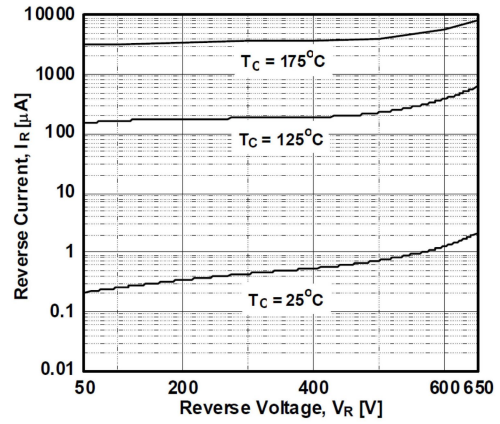
Switching Loss vs. Collector Current



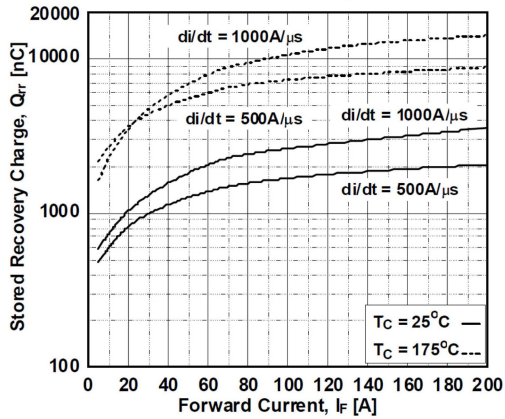
Forward Characteristics



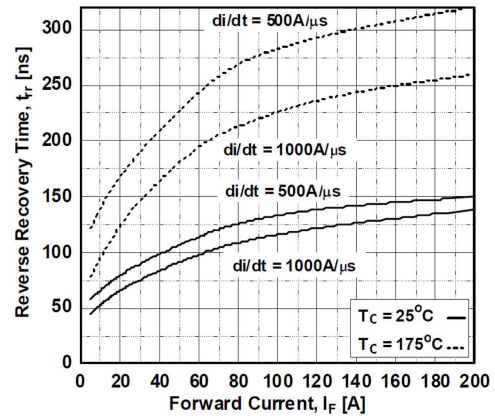
Reverse Current



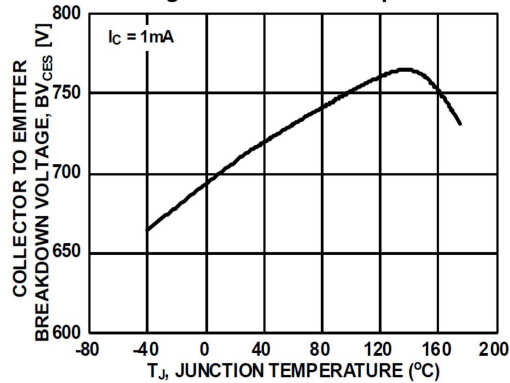
Stored Charge

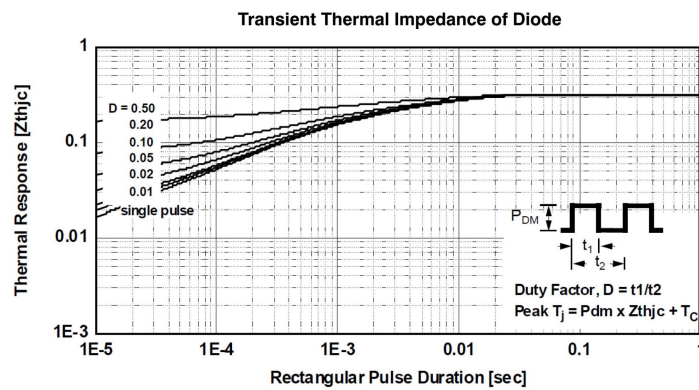
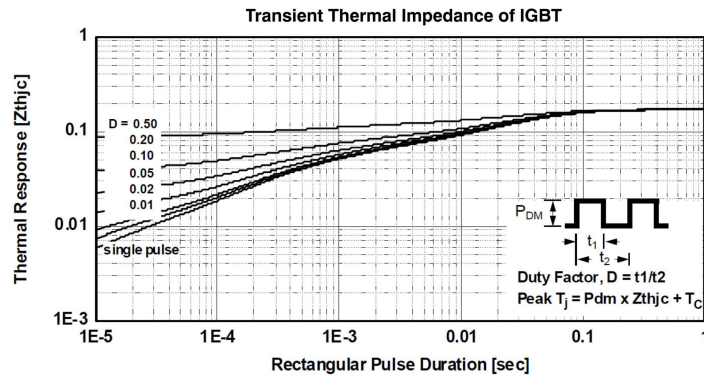


Reverse Recovery Time

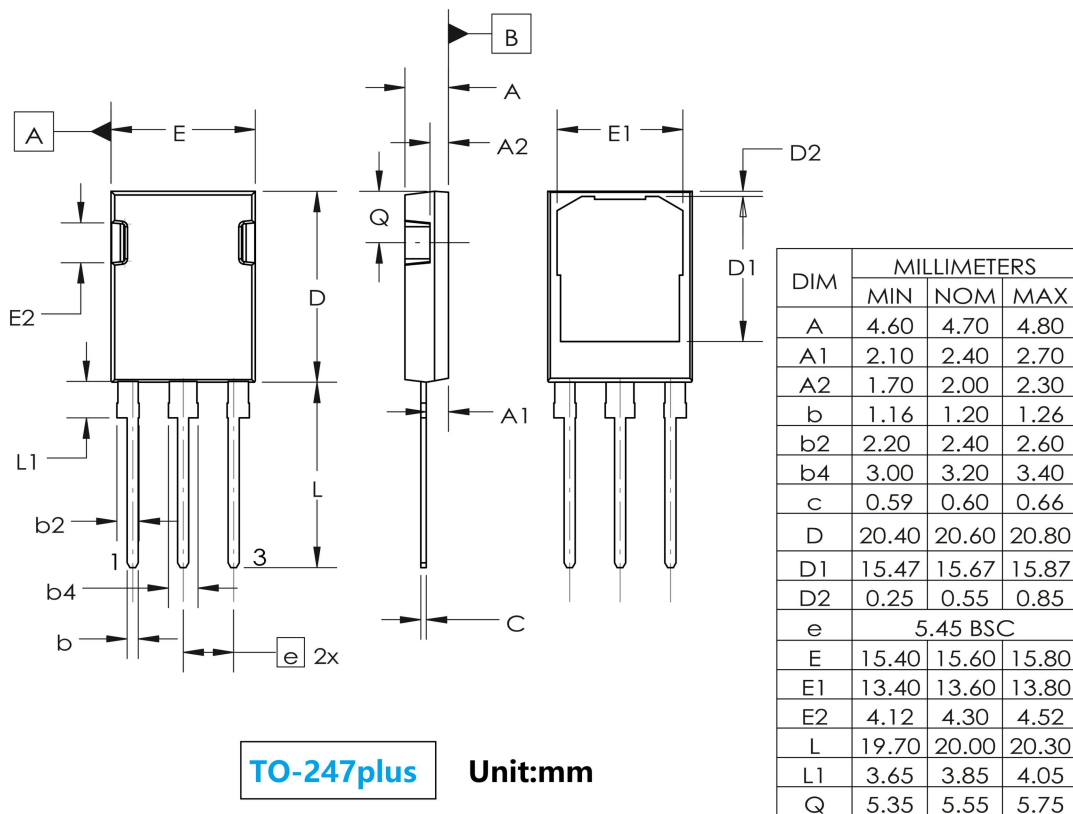


Collector to Emitter Breakdown Voltage vs. Junction Temperature





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