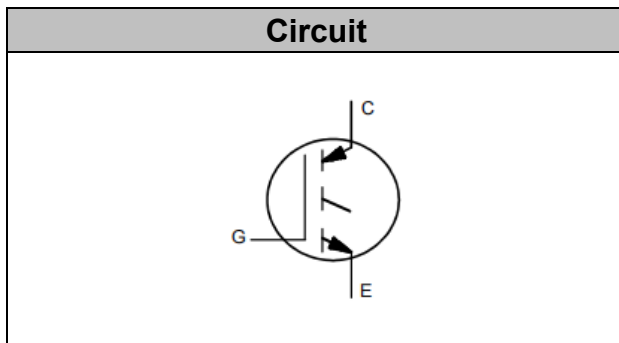


## IGBT Discrete

$V_{CE}$	<b>1200</b>	<b>V</b>
$I_C$	<b>40</b>	<b>A</b>
$V_{CE(SAT)} I_C=40A$	<b>1.85</b>	<b>V</b>
$P_D$	<b>625</b>	<b>W</b>



## Applications

- PTC heater

## Features

- High breakdown voltage to 1200V for improved reliability
- Maximum junction temperature 150°C
- Positive temperature coefficient
- Qualified to AEC-Q101

## Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	$V_{CE}$	1200	V
DC Collector Current, limited by $T_{jmax}$ $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	$I_C$	80 40	A
Continuous Gate-Emitter Voltage	$V_{GE}$	$\pm 20$	V
Transient Gate-Emitter Voltage ( $t_p \leq 10\mu s, D < 0.010$ )	$V_{GE}$	$\pm 30$	V
Turn off Safe Operating Area $V_{CE} \leq 1200V,$ $T_j \leq 150^{\circ}C$		160	A
Pulsed Collector Current, $V_{GE}=15V,$ $t_p$ limited by $T_{jmax}$	$I_{CM}$	160	A
Short Circuit Withstand Time, $V_{GE}=15V, V_{CC}=600V, V_{CEM} \leq 1200V$	$T_{sc}$	10	$\mu s$
Power Dissipation, $T_j=150^{\circ}C, T_c=25^{\circ}C$	$P_{tot}$	625	W



Operating Junction Temperature	$T_j$	-40...+150	°C
Storage Temperature	$T_s$	-55...+150	°C
Soldering Temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	°C

### Electrical Characteristics of the IGBT ( $T_j = 25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$V_{GE}=0V, I_C=250\mu A$	1200		-	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.4mA$	4.8	5.6	6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=40A$ $T_j=25^\circ\text{C}$ , $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$		1.85 2.20 2.30	2.40	V
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V$ $T_j=25^\circ\text{C}$ , $T_j=150^\circ\text{C}$			0.25 5.00	mA
Gate-Emitter Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 30V$			200	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Dynamic</b>						
Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz$	-	2.50	-	nF
Reverse Transfer Capacitance	$C_{res}$		-	0.09	-	
Gate Charge	$Q_G$	$V_{CC}=960V, I_C=40A,$ $V_{GE}=15V$	-	0.33	-	uC
Short Circuit Collector Current	$I_{SC}$	$V_{GE}=15V, t_{sc}\leq 10\mu s,$ $V_{CC}=900V, T_j\leq 150^\circ\text{C}$	-	140	-	A

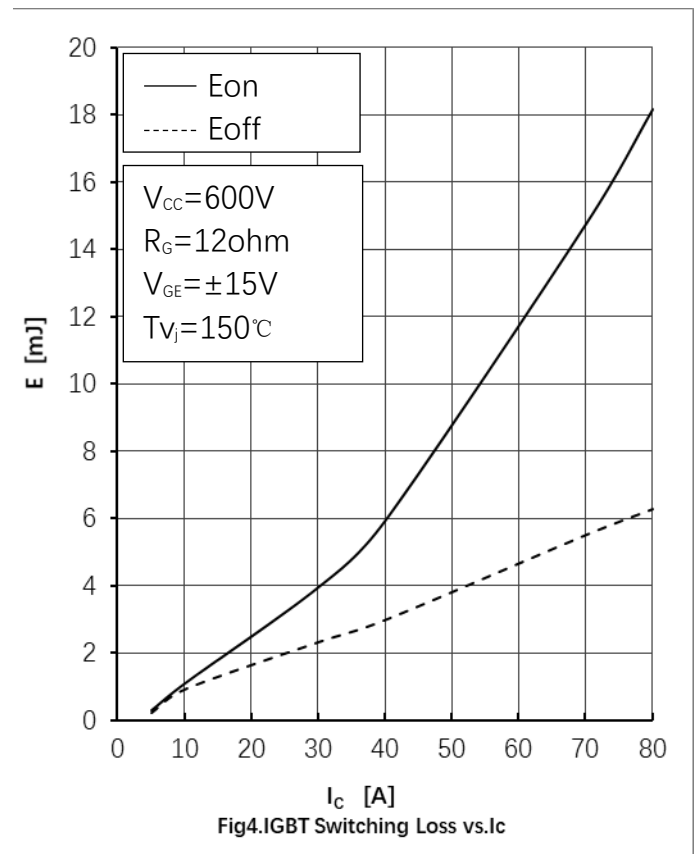
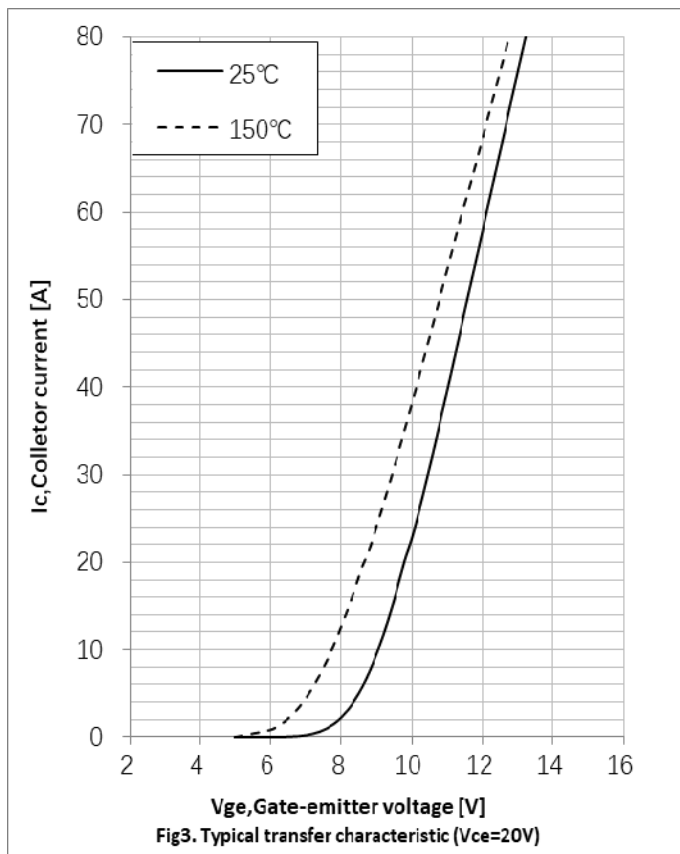
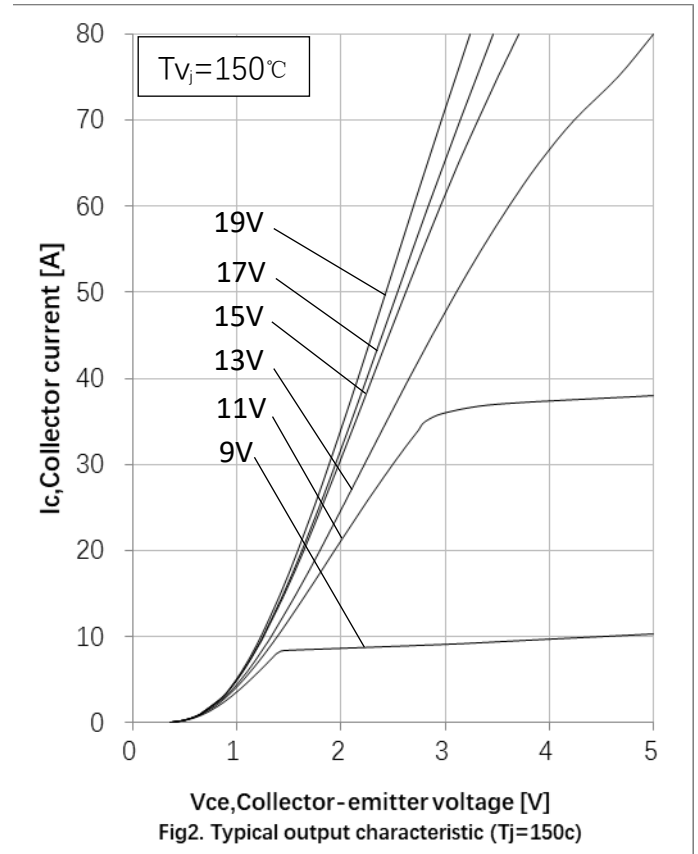
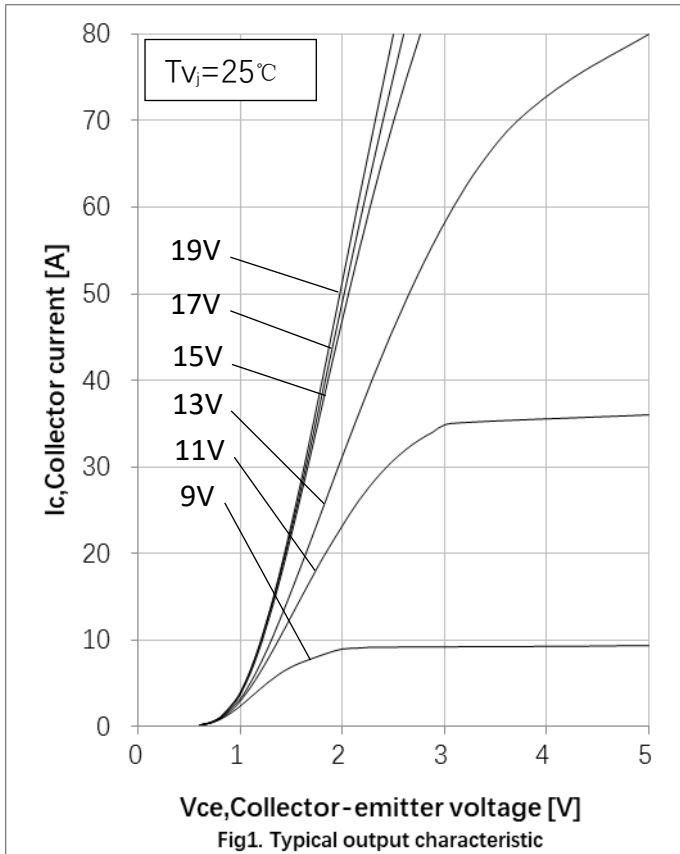


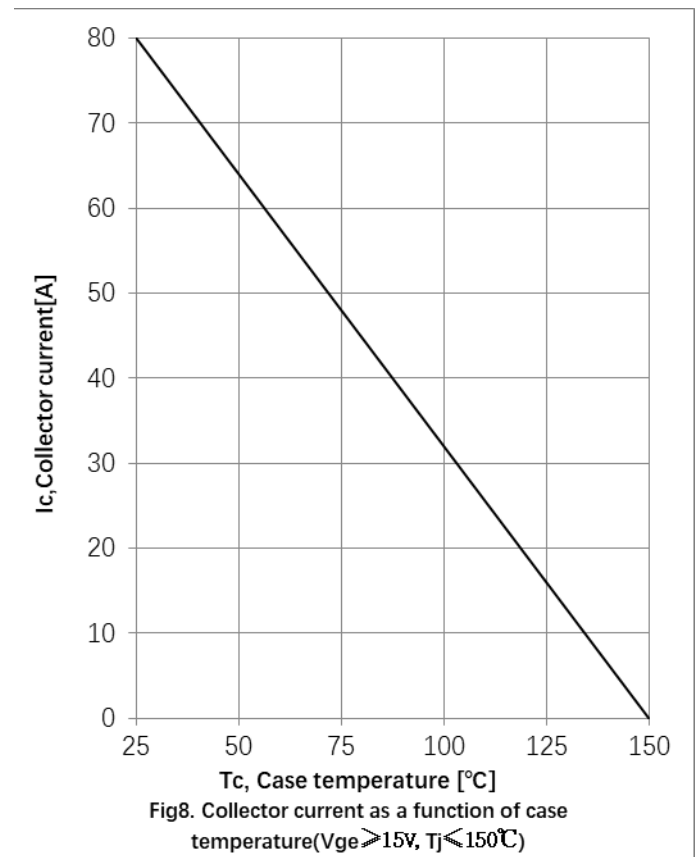
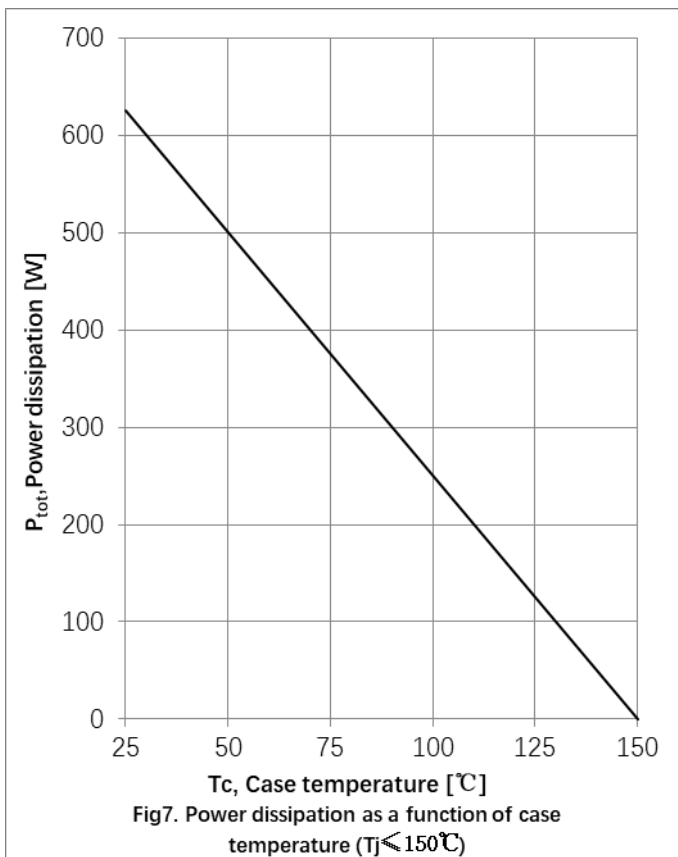
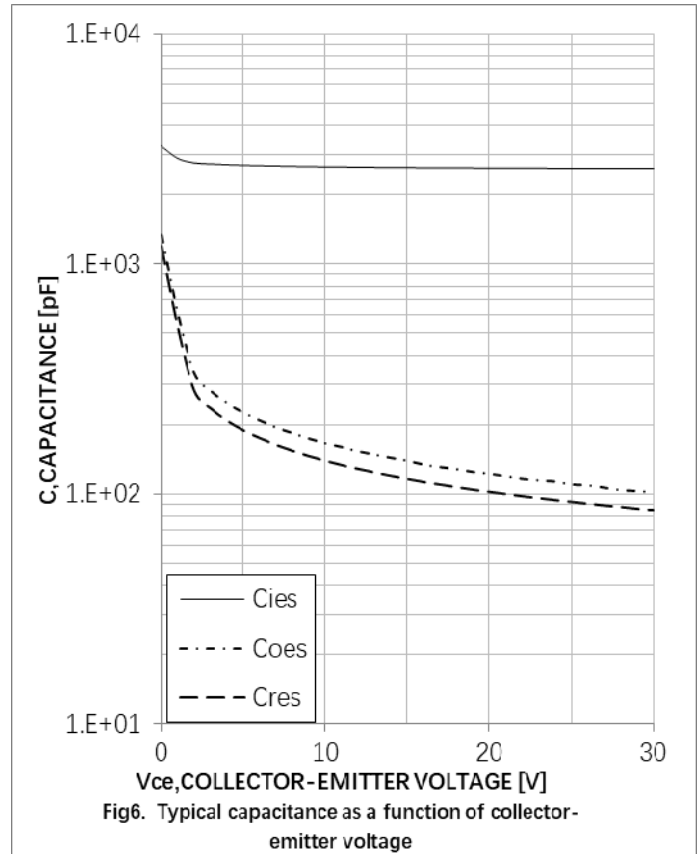
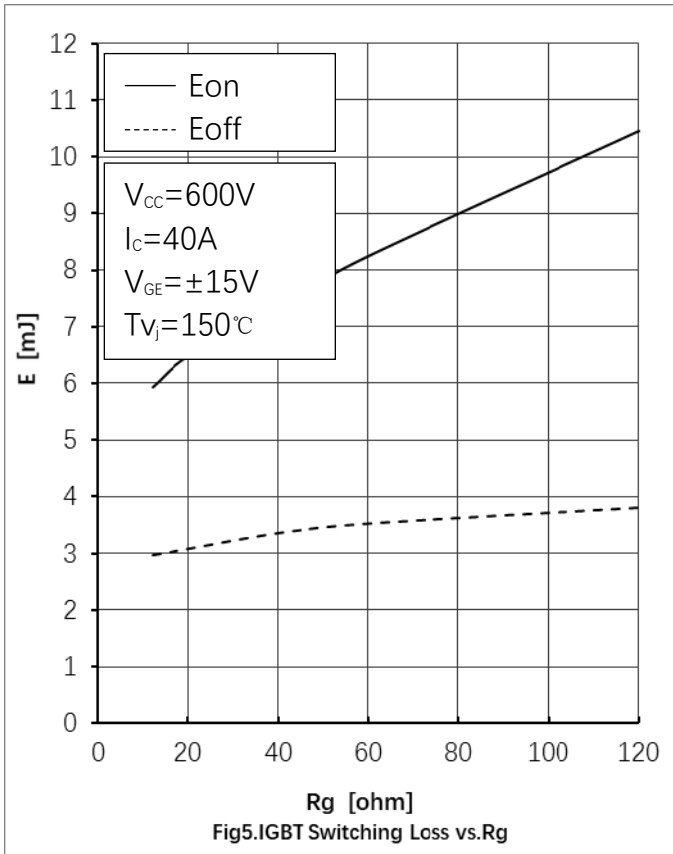
## Switching Characteristic, Inductive Load

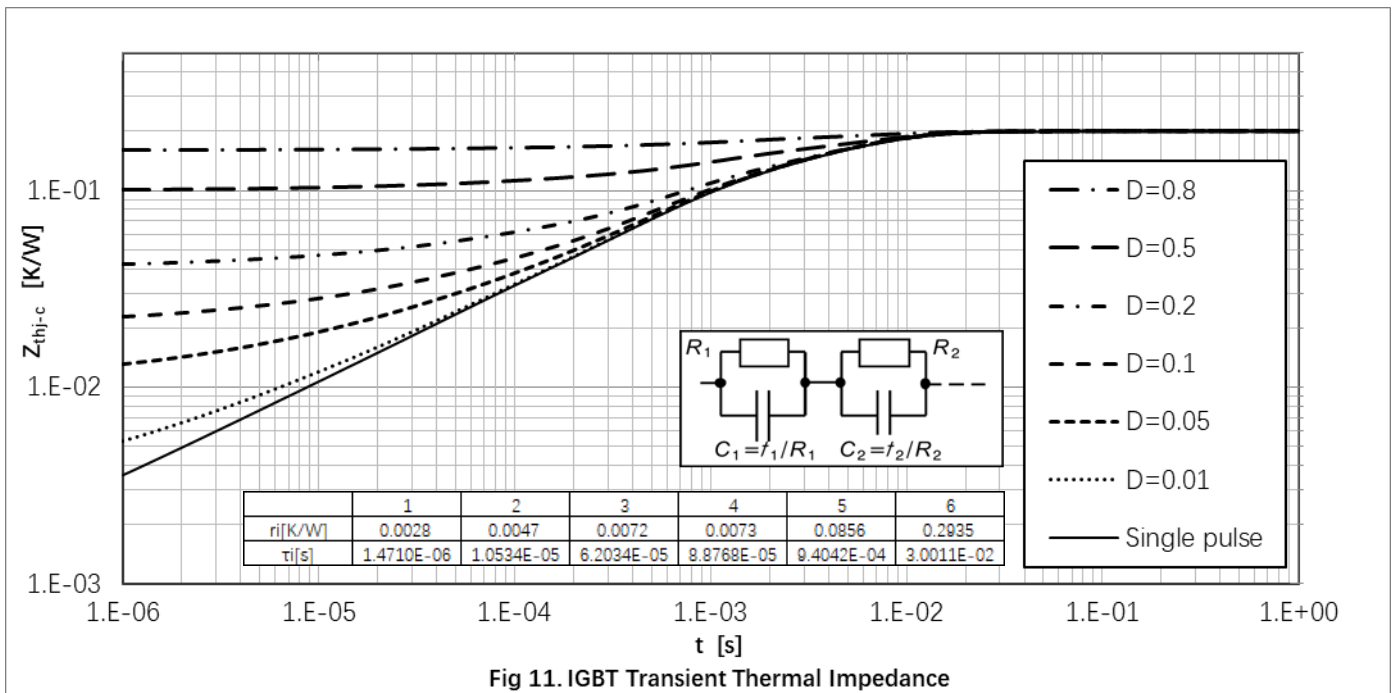
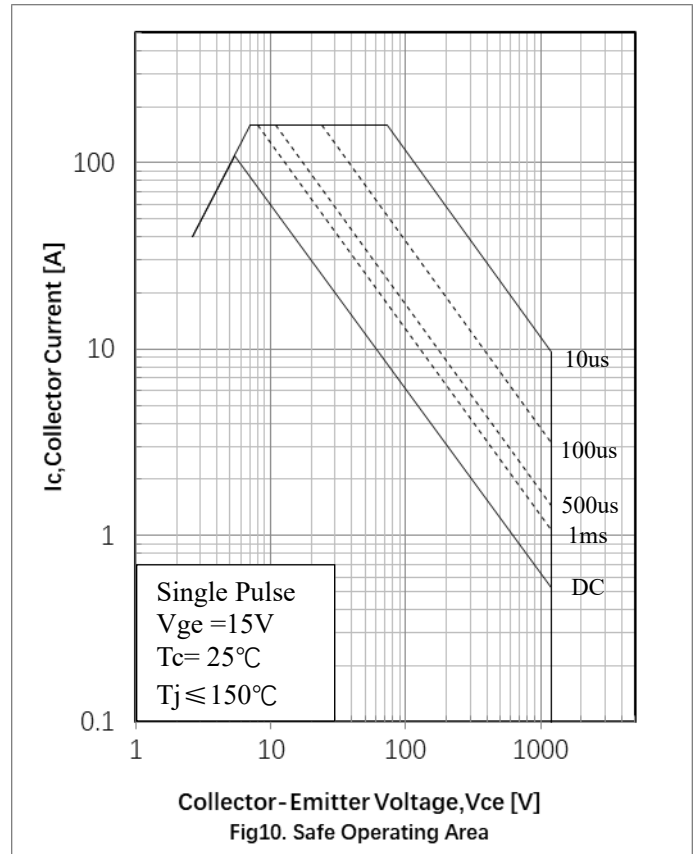
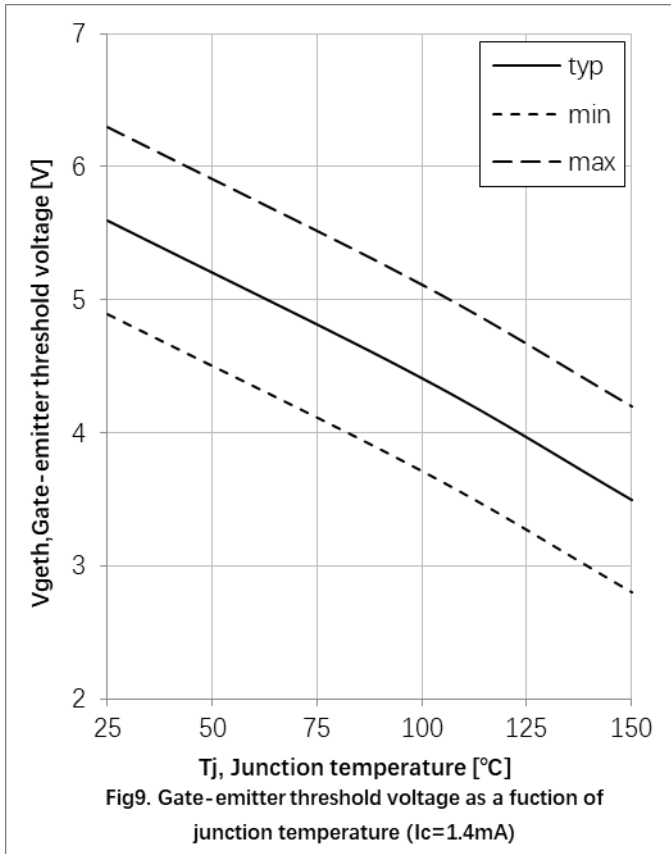
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Dynamic , at T<sub>j</sub>= 25°C</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>CC</sub> = 600V, I <sub>C</sub> =40A, V <sub>GE</sub> = -15V~15V, R <sub>g</sub> =12Ω	-	45	-	ns
Rise Time	t <sub>r</sub>		-	56	-	ns
Turn-on Energy	E <sub>on</sub>		-	3.8	-	mJ
Turn-off Delay Time	t <sub>d(off)</sub>		-	180	-	ns
Fall Time	t <sub>f</sub>		-	80	-	ns
Turn-off Energy	E <sub>off</sub>		-	1.7	-	mJ
<b>Dynamic , at T<sub>j</sub>= 125°C</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>CC</sub> = 600V, I <sub>C</sub> =40A, V <sub>GE</sub> = -15V~15V, R <sub>g</sub> =12Ω	-	50	-	ns
Rise Time	t <sub>r</sub>		-	58	-	ns
Turn-on Energy	E <sub>on</sub>		-	5.4	-	mJ
Turn-off Delay Time	t <sub>d(off)</sub>		-	240	-	ns
Fall Time	t <sub>f</sub>		-	85	-	ns
Turn-off Energy	E <sub>off</sub>		-	2.7	-	mJ
<b>Dynamic , at T<sub>j</sub>= 150°C</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>CC</sub> = 600V, I <sub>C</sub> =40A, V <sub>GE</sub> = -15V~15V, R <sub>g</sub> =12Ω	-	53	-	ns
Rise Time	t <sub>r</sub>		-	60	-	ns
Turn-on Energy	E <sub>on</sub>		-	5.8	-	mJ
Turn-off Delay Time	t <sub>d(off)</sub>		-	260	-	ns
Fall Time	t <sub>f</sub>		-	90	-	ns
Turn-off Energy	E <sub>off</sub>		-	3.0	-	mJ

## Thermal Resistance

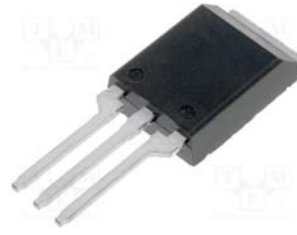
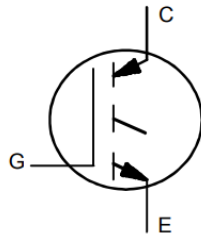
Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R <sub>th(j-c)</sub>	0.20	K/W
Thermal Resistance, Junction - Ambient	R <sub>th(j-a)</sub>	62	K/W



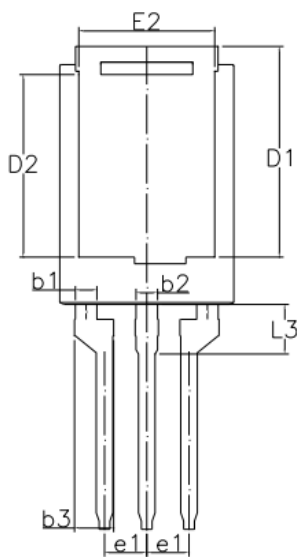
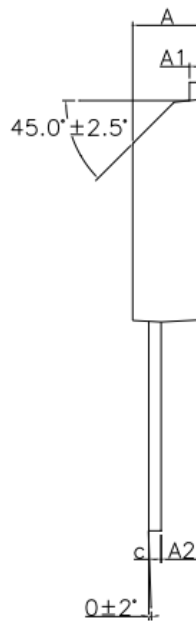
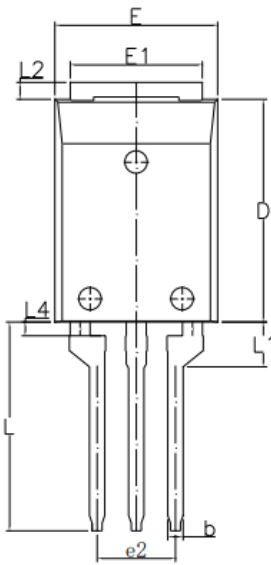




## Circuit Diagram

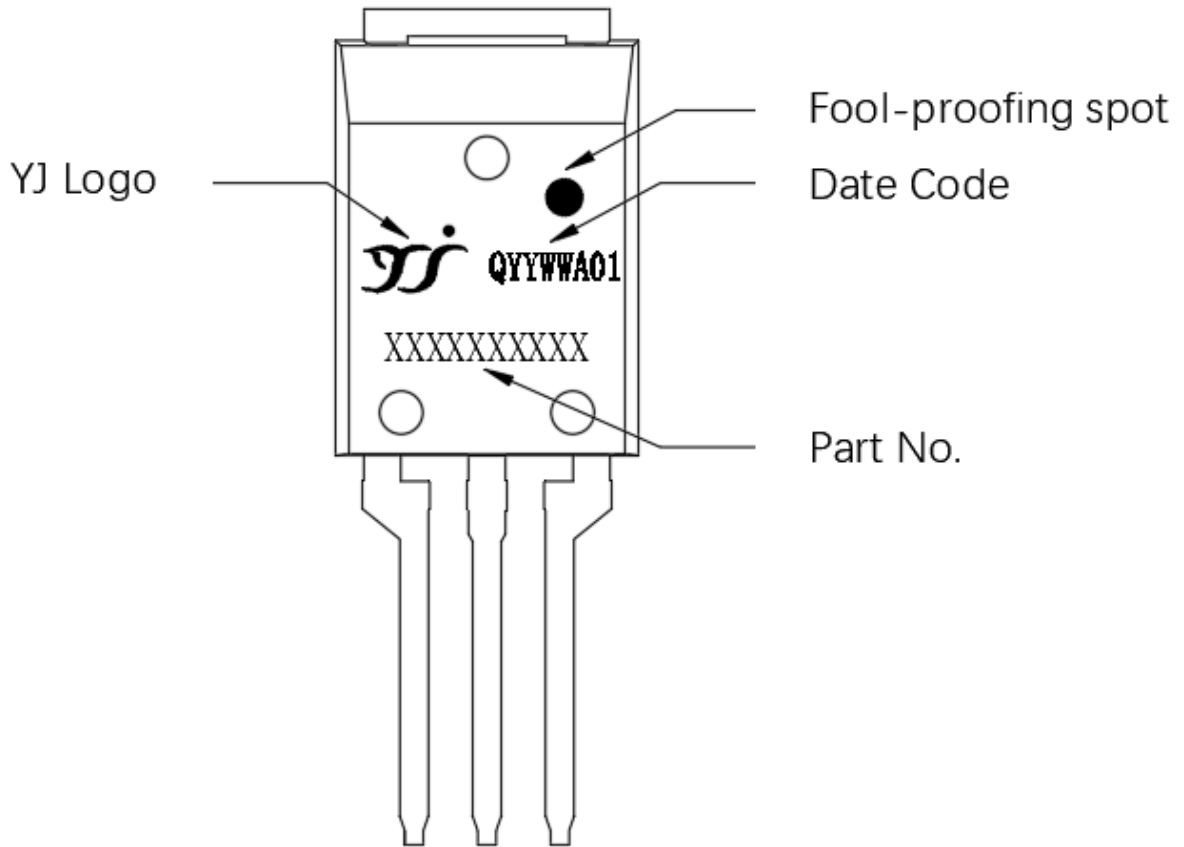


- **Package Outline Information**  
**CASE: STO 220**



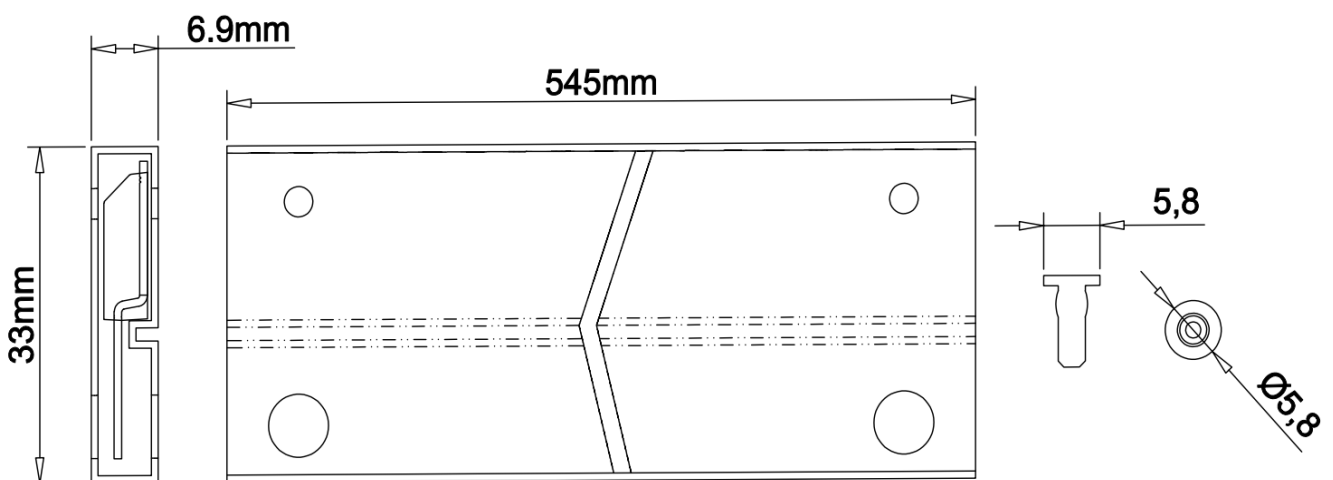
## Marking Information

DIMENSIONS		
SYMBOL	Millimeter	
A	4.34	4.74
A1	0.70	1.00
A2	2.50	3.00
b	0.70	1.30
b1	1.25	1.65
b2	1.25	1.65
b3	2.16	2.36
c	0.70	1.00
D	14.00	15.00
D1	12.50	13.50
D2	10.54	11.54
E	10.00	11.00
E1	8.00	9.00
E2	7.70	8.70
e1	2.55 BSC	
e2	4.90	5.30
L	13.00	14.50
L1	2.65	3.15
L2	0.50	1.50
L3	2.75	3.25
L4	—	1.50



## Package Parameters

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
DGS40N120ATL0AQ	STO-220	Tube	50	DGS40N120ATL0AQ



ISSUE	REVISION	DATE
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