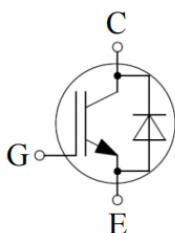


IGBT Discrete

V_{CE}	650	V
I_C	50	A
$V_{CE(SAT)} I_C=50A$	1.40	V

Circuit



Applications

- Solar converters
- Uninterruptible power supplies
- Welding converters
- Mid to high range switching frequency converters

Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175°C
- Positive temperature coefficient
- High ruggedness, temperature stable

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC Collector Current, limited by T_{jmax} $T_C=25^\circ C$ value limited by bondwire $T_C=100^\circ C$	I_C	80 60	A
Diode Forward Current, limited by T_{jmax} $T_C=25^\circ C$ value limited by bondwire $T_C=100^\circ C$	I_F	80 60	A
Continuous Gate-Emitter Voltage	V_{GE}	± 20	V
Transient Gate-Emitter Voltage ($t_p \leq 10\mu s, D < 0.010$)	V_{GE}	± 30	V
Turn off Safe Operating Area $V_{CE} \leq 650V$, $T_j \leq 150^\circ C$		200	A
Pulsed Collector Current, $V_{GE}=15V$, t_p limited by T_{jmax}	I_{CM}	200	A
Diode Pulsed Current, t_p limited by T_{jmax}	I_{Fpuls}	200	A
Power Dissipation, $T_j=175^\circ C$, $T_C=25^\circ C$	P_{tot}	283	W

Operating Junction Temperature	T_j	-40...+175	°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
Static						
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	650		-	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=0.50mA$	3.8	4.8	5.8	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=50A$ $T_j=25^\circ\text{C},$ $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$	1.10	1.40 1.60 1.70	1.70	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$ $T_j = 25^\circ\text{C},$ $T_j=150^\circ\text{C}$			0.25 3.00	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}= 0V, V_{GE}= \pm 20V$			100	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	$V_{CE}= 25V, V_{GE}= 0V,$ $f = 1MHz$	-	2.86	-	nF
Reverse Transfer Capacitance	C_{res}		-	0.02	-	
Gate Charge	Q_G	$V_{CC}=520V, I_C=50A,$ $V_{GE}=15V$	-	0.14	-	uC

Electrical Characteristics of the Diode (T_j= 25°C unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Diode Forward Voltage	V _F	I _F = 50A T _j = 25°C, T _j = 125°C T _j = 150°C		1.60 1.50 1.40	2.00	V

Switching Characteristic, Inductive Load

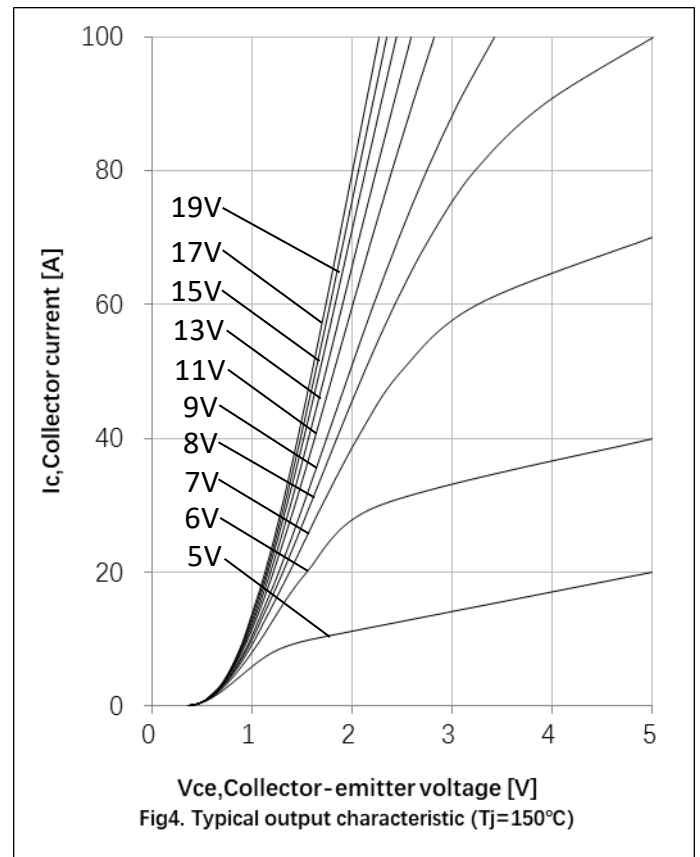
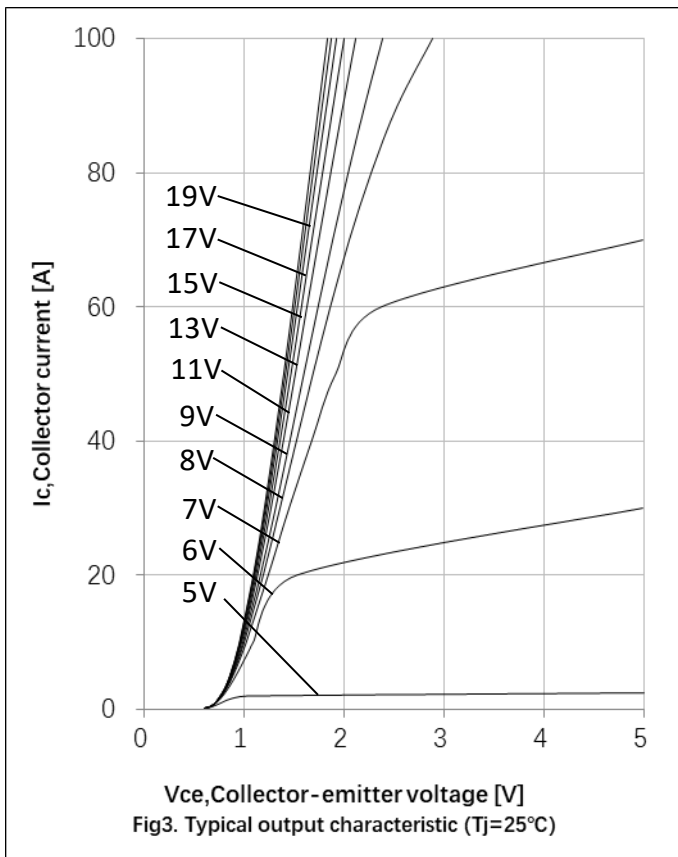
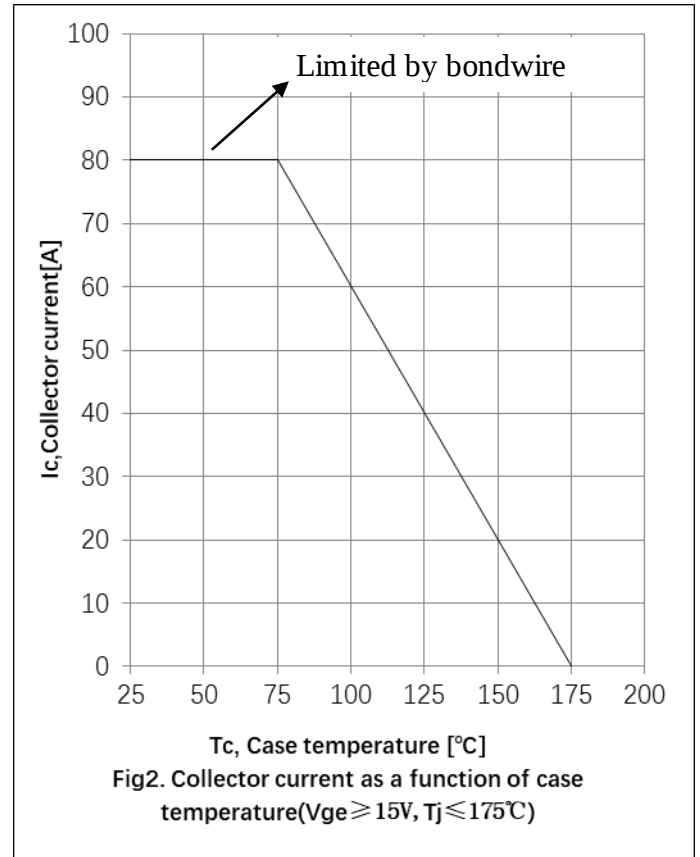
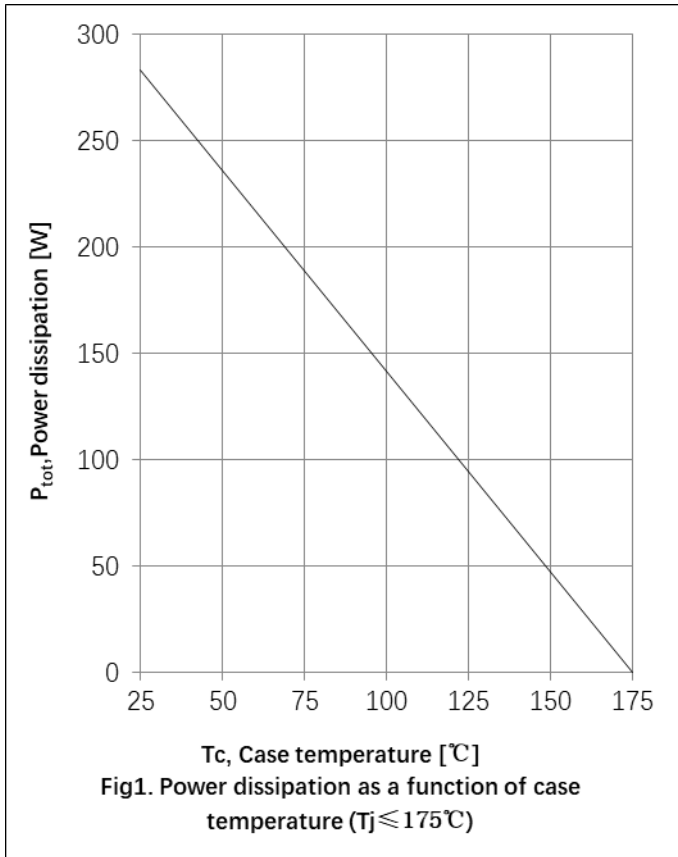
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T _j = 25℃						
Turn-on Delay Time	t _{d(on)}	V _{CC} =400V, I _C =50A, V _{GE} = -5v~15V, R _g =10Ω, Inductive Load	-	23	-	ns
Rise Time	t _r		-	31	-	ns
Turn-on Energy	E _{on}		-	1.89	-	mJ
Turn-off Delay Time	t _{d(off)}		-	83	-	ns
Fall Time	t _f		-	49	-	ns
Turn-off Energy	E _{off}		-	0.55	-	mJ
Total switching energy	E _{ts}		-	2.44	-	mJ
Dynamic , at T _j = 125℃						
Turn-on Delay Time	t _{d(on)}	V _{CC} =400V, I _C =50A, V _{GE} = -5v~15V, R _g =10Ω, Inductive Load	-	24	-	ns
Rise Time	t _r		-	38	-	ns
Turn-on Energy	E _{on}		-	1.93	-	mJ
Turn-off Delay Time	t _{d(off)}		-	90	-	ns
Fall Time	t _f		-	62	-	ns
Turn-off Energy	E _{off}		-	0.76	-	mJ
Total switching energy	E _{ts}		-	2.69	-	mJ
Dynamic , at T _j = 150℃						
Turn-on Delay Time	t _{d(on)}	V _{CC} =400V, I _C =50A, V _{GE} = -5v~15V, R _g =10Ω, Inductive Load	-	25	-	ns
Rise Time	t _r		-	42	-	ns
Turn-on Energy	E _{on}		-	1.99	-	mJ
Turn-off Delay Time	t _{d(off)}		-	95	-	ns
Fall Time	t _f		-	70	-	ns
Turn-off Energy	E _{off}		-	0.81	-	mJ
Total switching energy	E _{ts}		-	2.80	-	mJ

Electrical Characteristics of the DIODE

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T _j = 25 °C						
Reverse Recovery Current	I _{rr}	I _F =50A, V _R =400V -di/dt=450A/μs,	-	15	-	A
Reverse Recovery Charge	Q _{rr}		-	1.58	-	uC
Diode reverse recovery time	trr		-	148	-	ns
Reverse Recovery Energy	E _{rec}		-	0.29	-	mJ
Dynamic , at T _j = 125°C						
Reverse Recovery Current	I _{rr}	I _F =50A, V _R =400V -di/dt=450A/μs,	-	21	-	A
Reverse Recovery Charge	Q _{rr}		-	2.54	-	uC
Diode reverse recovery time	trr		-	183	-	ns
Reverse Recovery Energy	E _{rec}		-	0.65	-	mJ
Dynamic , at T _j = 150°C						
Reverse Recovery Current	I _{rr}	I _F =50A, V _R =400V -di/dt=450A/μs,	-	24	-	A
Reverse Recovery Charge	Q _{rr}		-	3.59	-	uC
Diode reverse recovery time	trr		-	218	-	ns
Reverse Recovery Energy	E _{rec}		-	0.79	-	mJ

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R _{th(j-c)}	0.53	K/W
Diode Thermal Resistance, Junction - Case	R _{th(j-c)}	1.05	K/W
Thermal Resistance, Junction - Ambient	R _{th(j-a)}	40	K/W



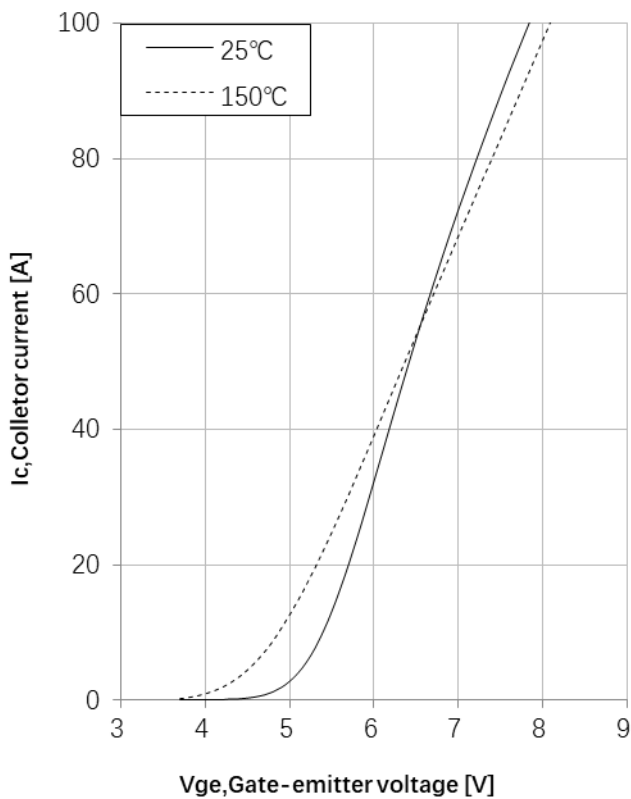


Fig5. Typical transfer characteristic ($V_{ce}=20V$)

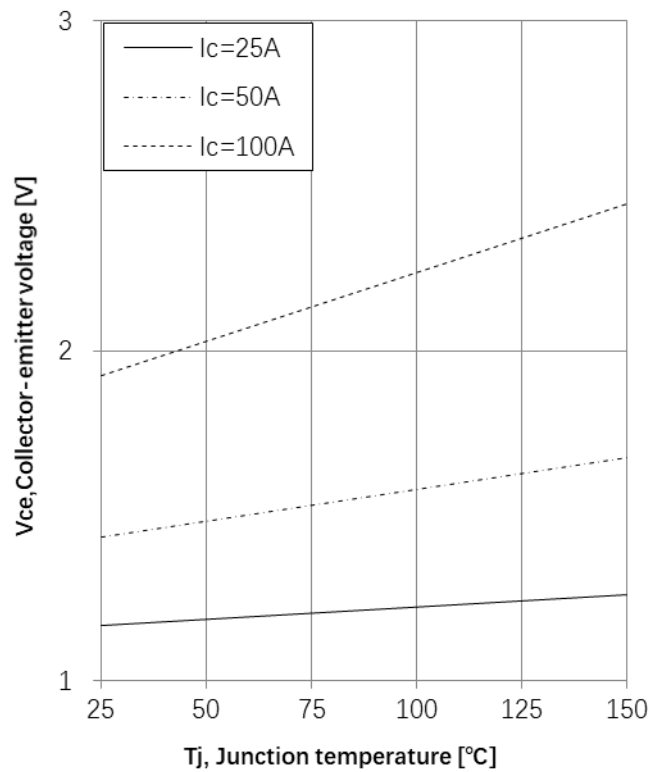


Fig6. Typical collector-emitter saturation voltage as a function of junction temperature ($V_{ge}=15V$)

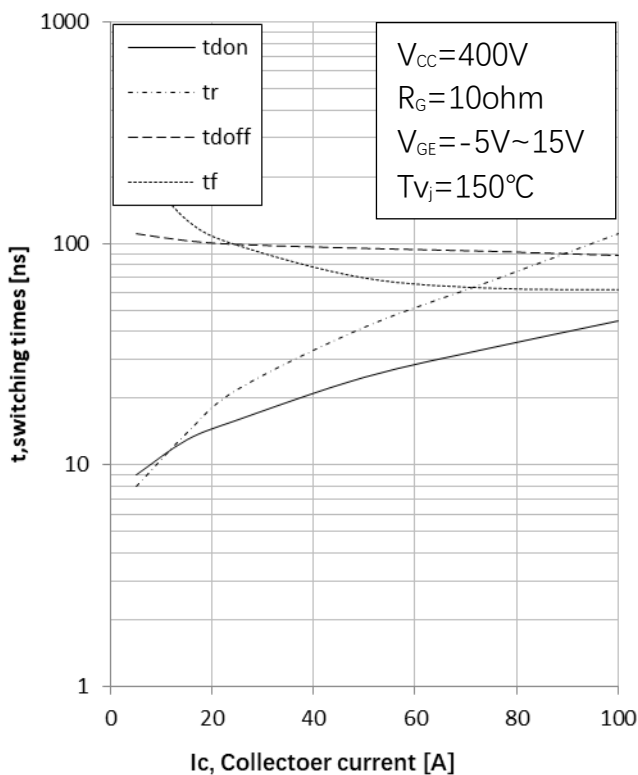


Fig7. Typical switching times as a function of collector current

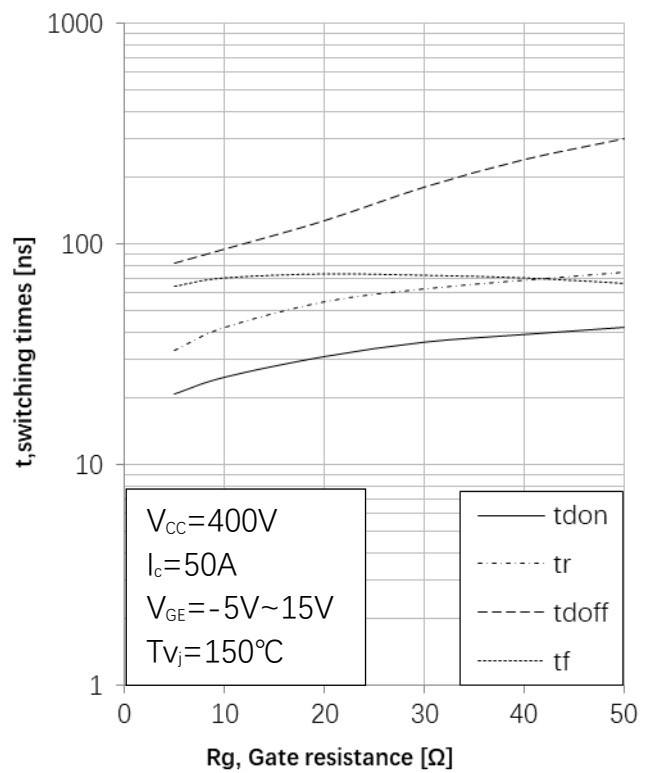
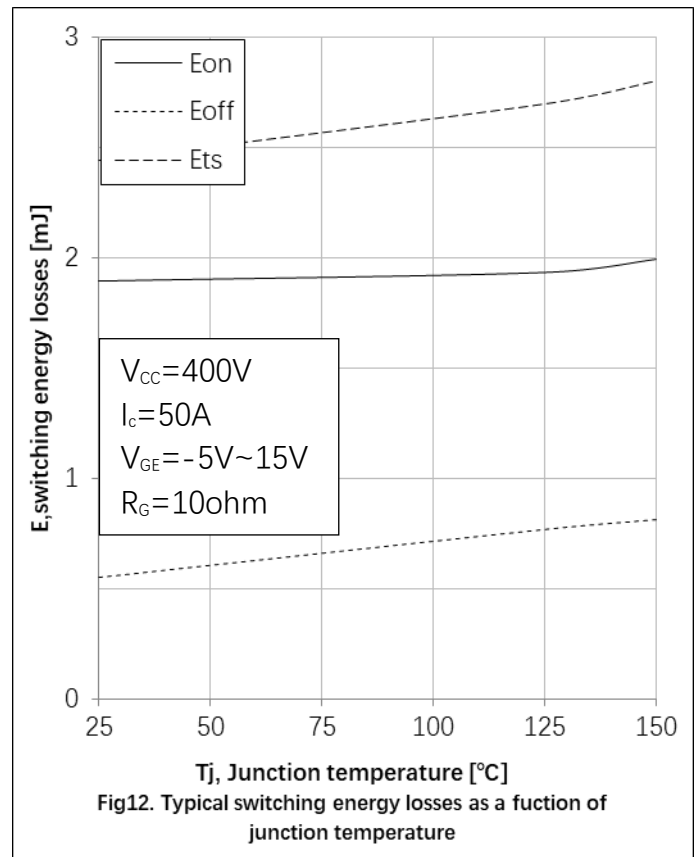
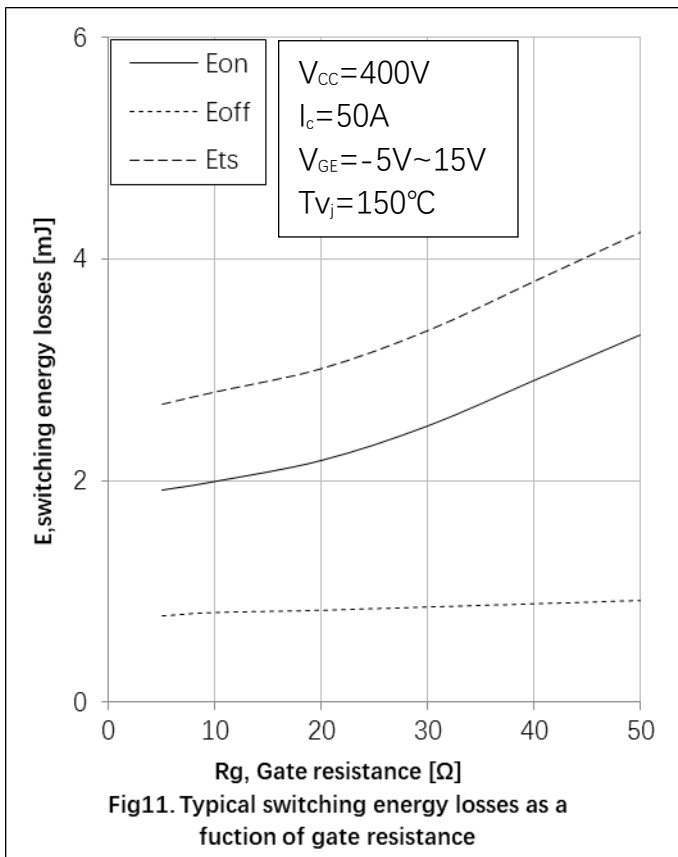
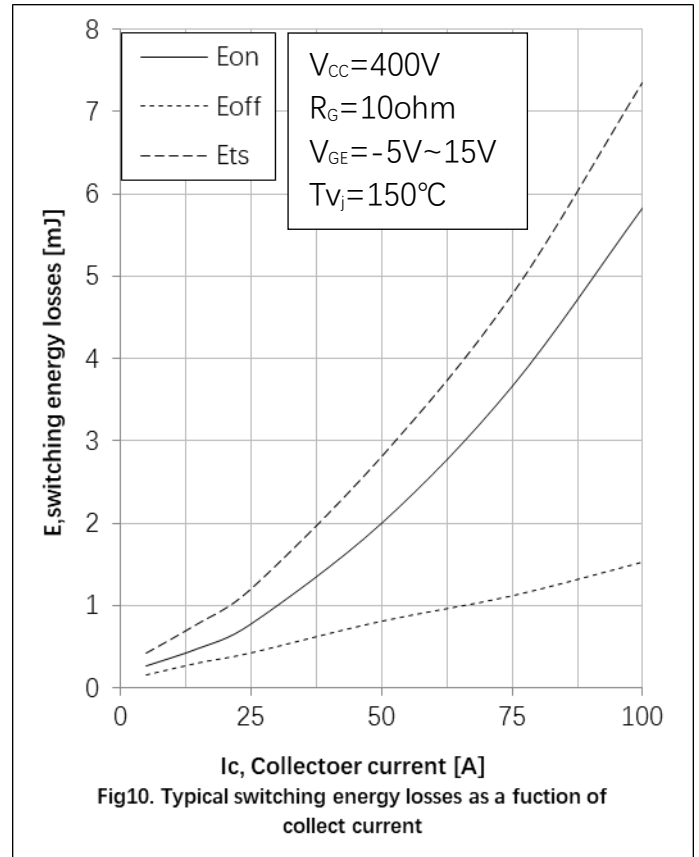
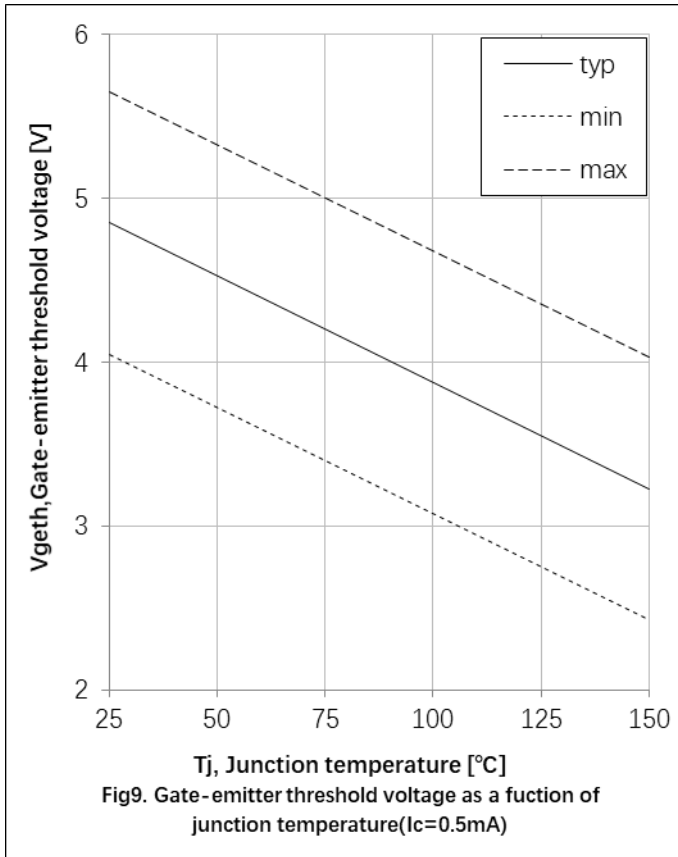
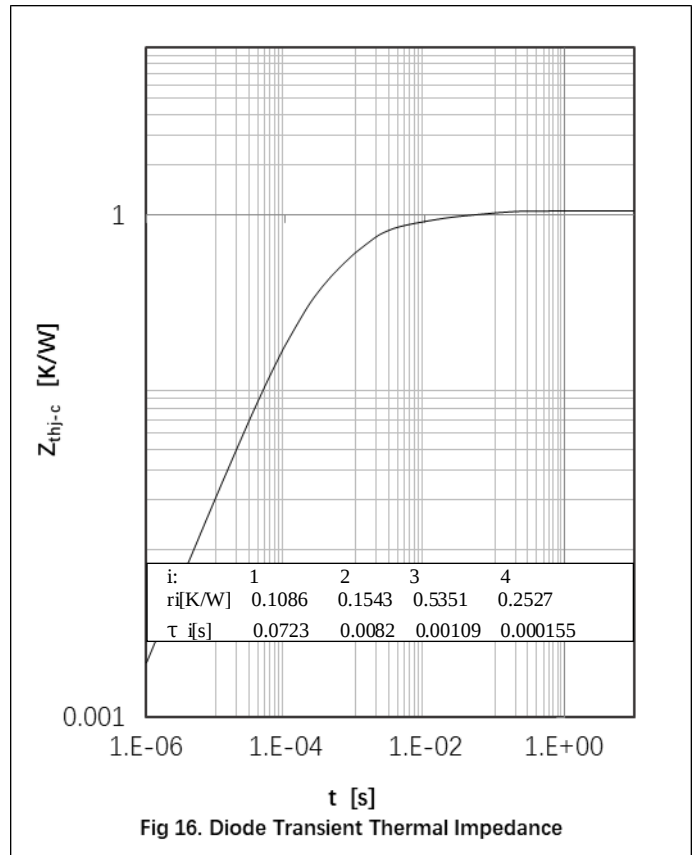
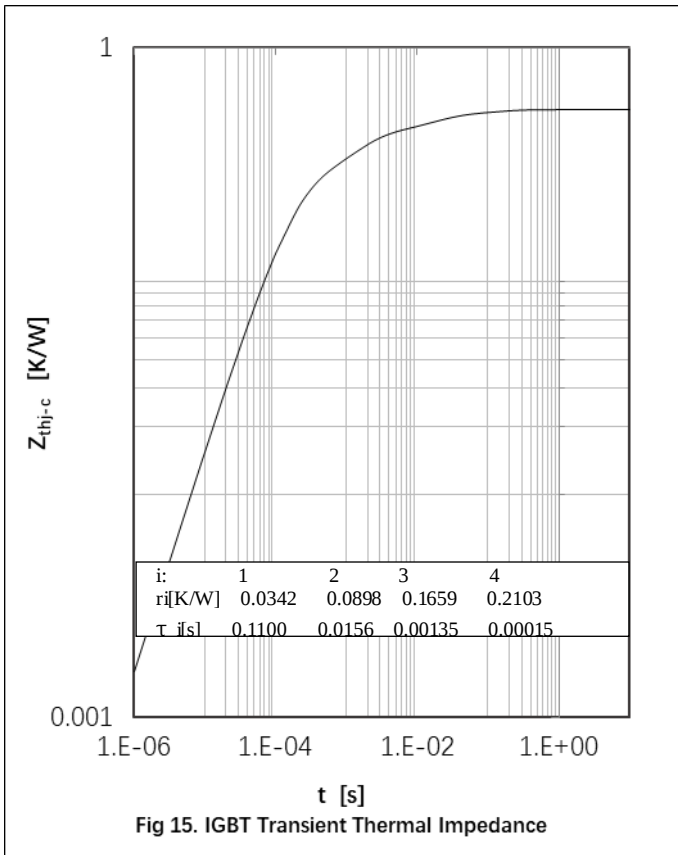
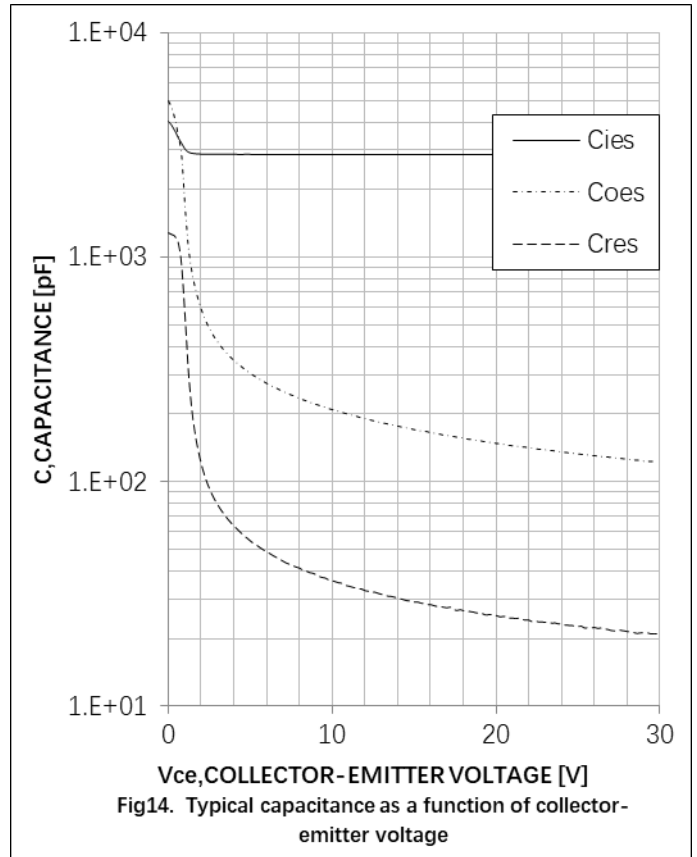
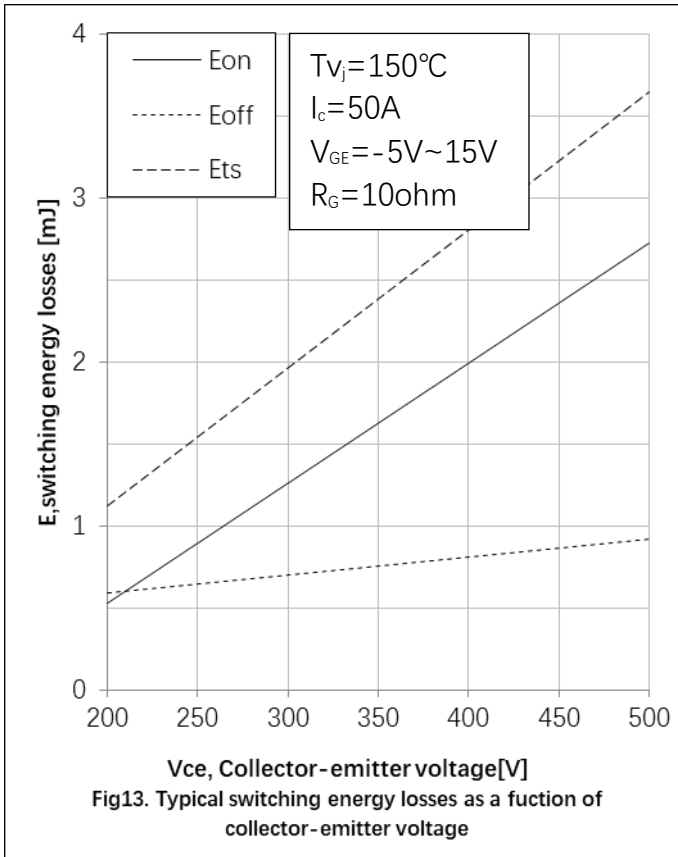
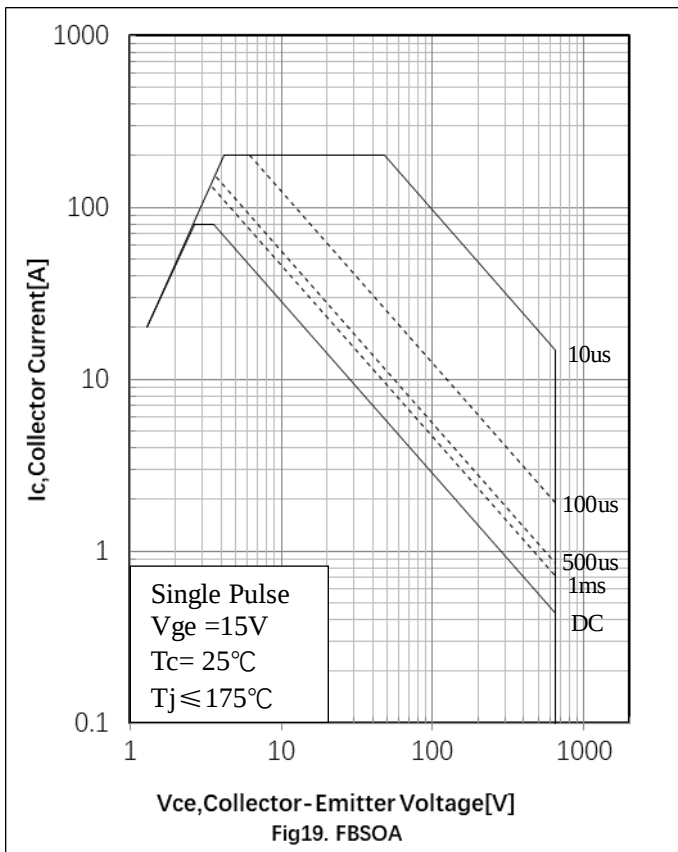
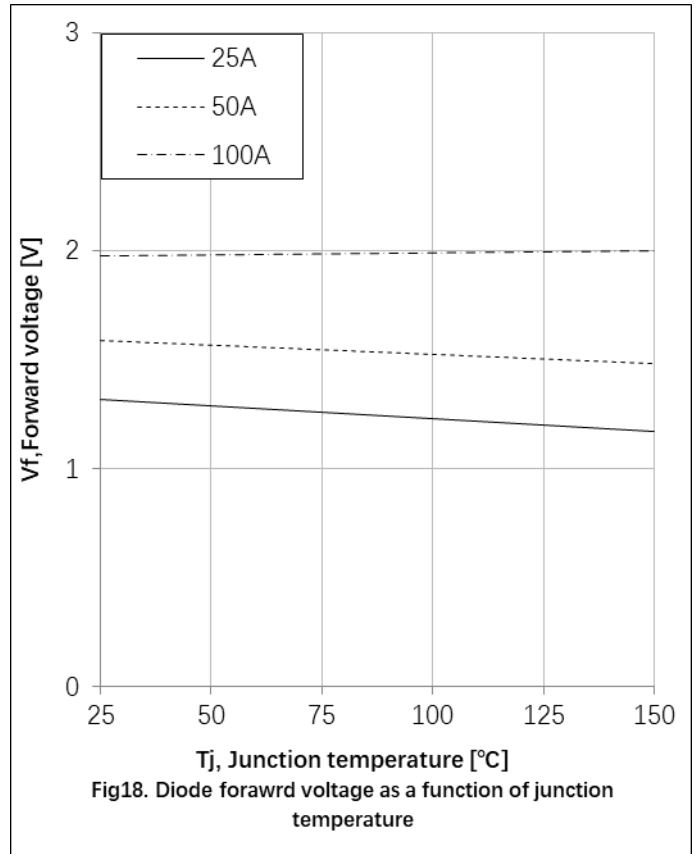
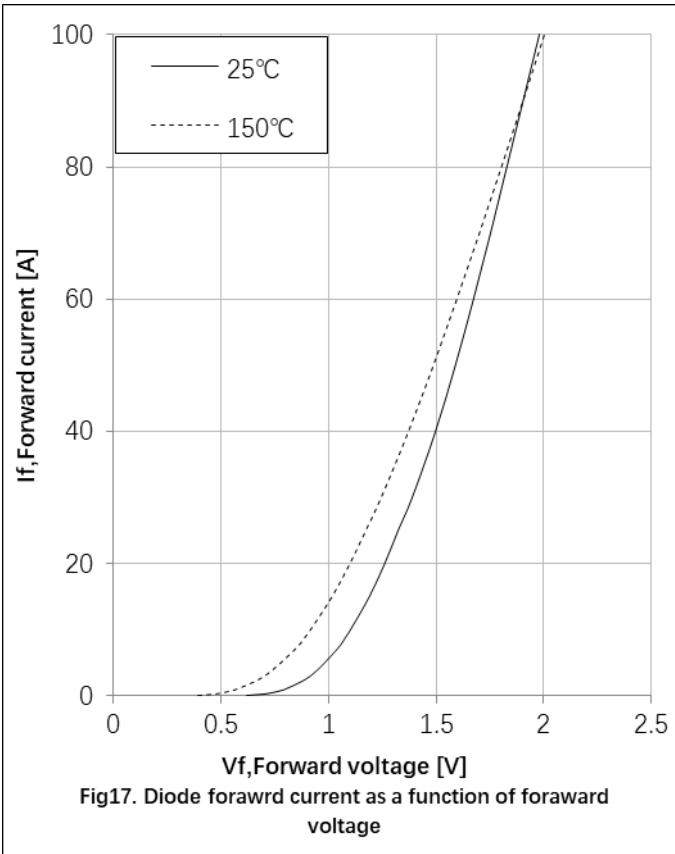


Fig8. Typical switching times as a function of gate resistance



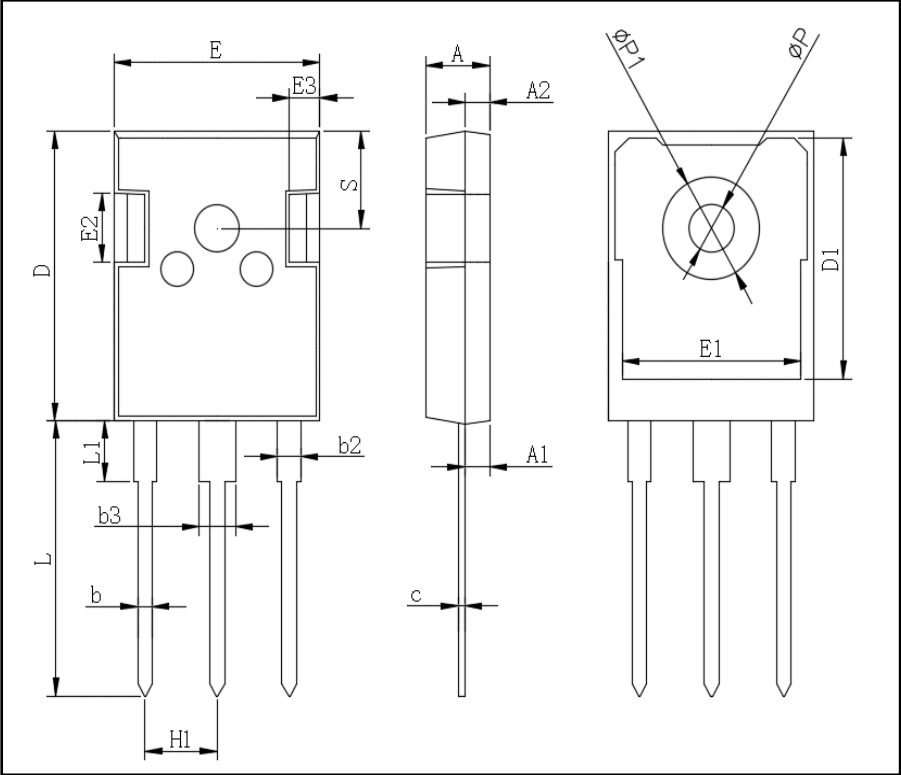




● Circuit Diagram

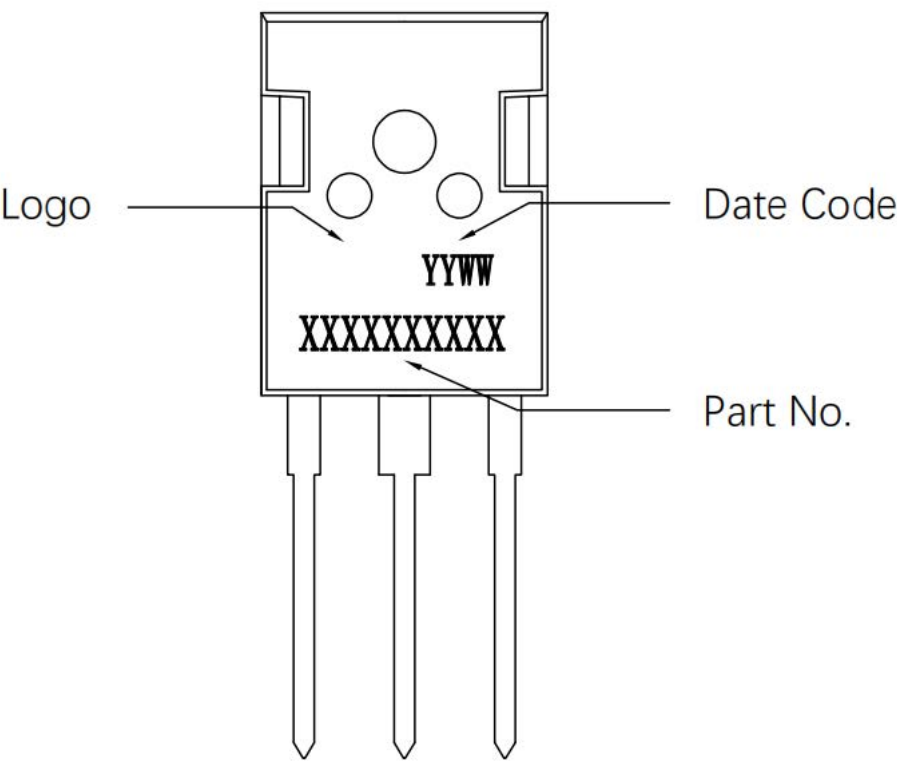


● Package Outline Information



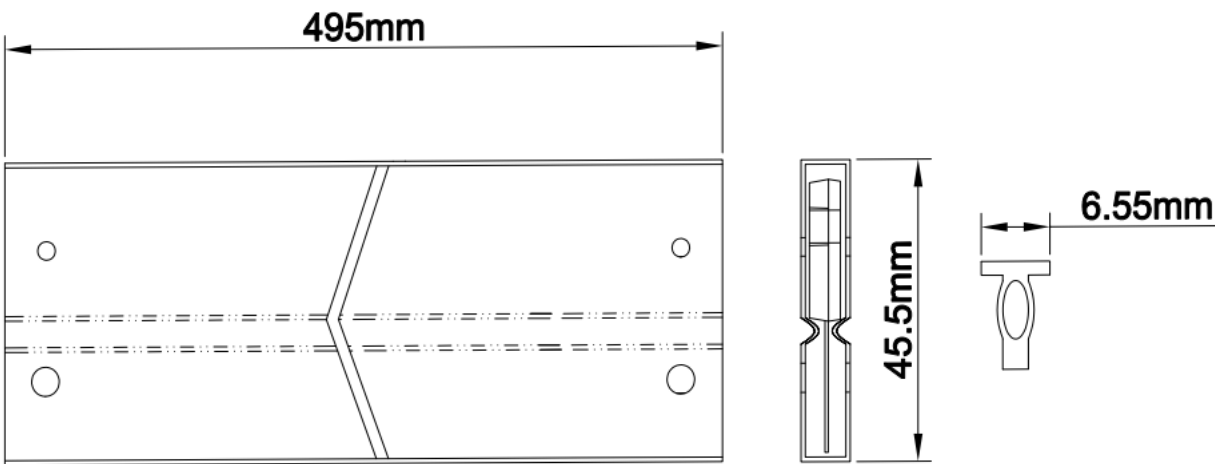
TO-247AB		
Dim	Min	Max
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.0	1.4
b2	1.91	2.21
C	0.5	0.7
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.0	13.6
E2	4.80	5.20
E3	2.30	2.70
L	19.62	20.22
L1	-	4.30
Φ P	3.40	3.80
Φ P1	-	7.30
S	6.15TYP	
H1	5.44TYP	
b3	2.80	3.20

Marking Information



Package Parameters

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
DGW50N65CTS2A	TO-247	Tube	30	DGW50N65CTS2A



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