DGW60N65CTL1E

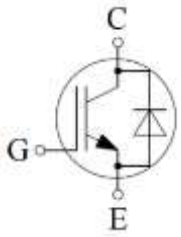
RoHS COMPLIANT



IGBT Discrete

V_{CE}	650	V
I_C	60	A
$V_{CE(SAT)}$ I_C=50A	1.65	V

Circuit



Applications

- Solar converters
- Uninterruptible power supplies
- Welding converters

Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175℃
- 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°C value limited by bondwire T_C= 100°C	I_C	80 60	A
Diode Forward Current, limited by T_{jmax} T_C= 25°C value limited by bondwire T_C= 100°C	I_F	80 60	A
Continuous Gate-Emitter Voltage	V_{GE}	±20	V
Transient Gate-Emitter Voltage (tp≤10μs,D<0.010)	V_{GE}	±30	V
Turn off Safe Operating Area V_{CE}≤ 650V, T_j≤ 150°C		120	A
Pulsed Collector Current, V_{GE}=15V, tp limited by T_{jmax}	I_{CM}	120	A
Diode Pulsed Current, tp limited by T_{jmax}	I_{Fpuls}	120	A
Short Circuit Withstand Time, V_{GE}= 15V, V_{CC}=300V, V_{CEM}≤650V	T_{sc}	5	μs
Power Dissipation , Tj=175°C, Tc=25°C	P_{tot}	320	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℃unless otherwise specified）:

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Collector-Emitter Breakdown Voltage	BV_{CES}	V_{GE}=0V, I_C=250μA	650		-	V
Gate Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=1mA	4.7	5.5	6.2	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=60A T_j=25°C, T_j=125°C T_j=150°C	1.35	1.65 1.85 2.00	1.95	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V, V_{GE}=0V T_j= 25°C, T_j=150°C			0.25 3.00	mA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}= 0V, V_{GE}= ± 20V			100	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V, f = 1MHz	-	3.17	-	nF
Reverse Transfer Capacitance	C_{res}		-	0.05	-	
Gate Charge	Q_G	V_{CC}=520V,I_C=50A, V_{GE}=15V	-	0.16	-	uC
Short Circuit Collector Current	I_{SC}	V_{GE}=15V, tsc≤5us, Vcc=300V	-	285	-	A

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Diode Forward Voltage	V_F	I_F= 60A T_j= 25°C, T_j= 125°C T_j= 150°C		1.95 1.75 1.70	2.40	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=60A, V_{GE}= -5v~15V, Rg=10Ω, Inductive Load	-	24	-	ns
Rise Time	t_r		-	71	-	ns
Turn-on Energy	E_{on}		-	4.17	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	95	-	ns
Fall Time	t_f		-	111	-	ns
Turn-off Energy	E_{off}		-	1.44	-	mJ
Total switching energy	Ets		-	5.61	-	mJ
Dynamic , at T_j= 125℃						
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=400V, I_C=60A, V_{GE}= -5v~15V, Rg=10Ω, Inductive Load	-	24	-	ns
Rise Time	t_r		-	72	-	ns
Turn-on Energy	E_{on}		-	4.30	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	104	-	ns
Fall Time	t_f		-	152	-	ns
Turn-off Energy	E_{off}		-	1.87	-	mJ
Total switching energy	Ets		-	6.17	-	mJ
Dynamic , at T_j= 150℃						
Turn-on Delay Time	$t_{d(on)}$	V_{CC}=400V, I_C=60A, V_{GE}= -5v~15V, Rg=10Ω, Inductive Load	-	24	-	ns
Rise Time	t_r		-	73	-	ns
Turn-on Energy	E_{on}		-	4.45	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	108	-	ns
Fall Time	t_f		-	169	-	ns
Turn-off Energy	E_{off}		-	2.06	-	mJ
Total switching energy	Ets		-	6.51	-	mJ

Electrical Characteristics of the DIODE

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25℃						
Reverse Recovery Current	I_{rr}	I_F=60A,V_R=400V -di/dt=450A/μs,	-	16	-	A
Reverse Recovery Charge	Q_{rr}		-	1.76	-	uC
Diode reverse recovery time	trr		-	155	-	ns
Reverse Recovery Energy	Erec		-	0.34	-	mJ
Dynamic , at Tj= 125℃						
Reverse Recovery Current	I_{rr}	I_F=60A,V_R=400V -di/dt=450A/μs,	-	22	-	A
Reverse Recovery Charge	Q_{rr}		-	2.83	-	uC
Diode reverse recovery time	trr		-	196	-	ns
Reverse Recovery Energy	Erec		-	0.71	-	mJ
Dynamic , at Tj= 150℃						
Reverse Recovery Current	I_{rr}	I_F=60A,V_R=400V -di/dt=450A/μs,	-	25	-	A
Reverse Recovery Charge	Q_{rr}		-	3.66	-	uC
Diode reverse recovery time	trr		-	227	-	ns
Reverse Recovery Energy	Erec		-	0.85	-	mJ

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R_{th}(j-c)	0.47	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

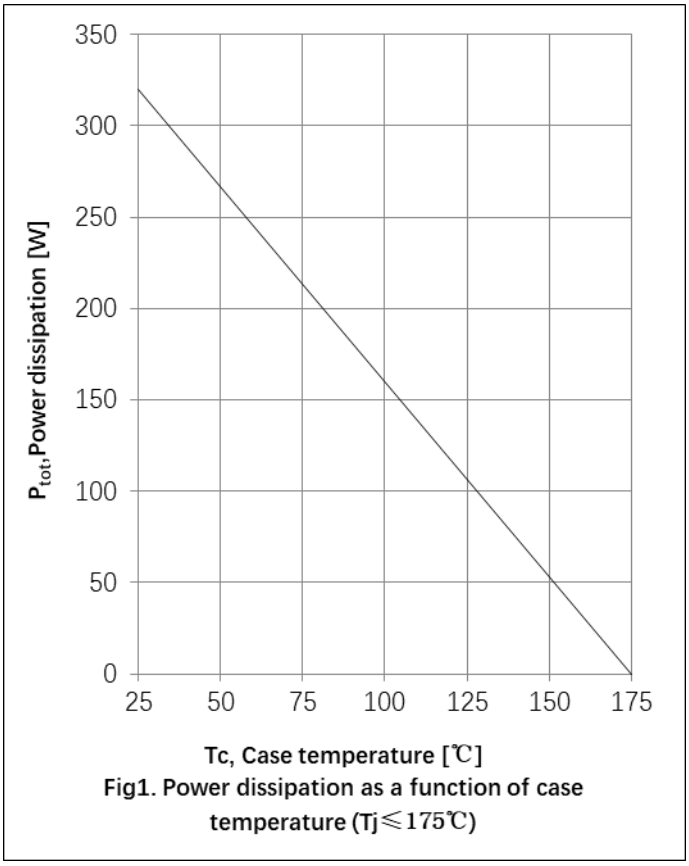


Fig1. Power dissipation as a function of case temperature (Tj≤175℃)

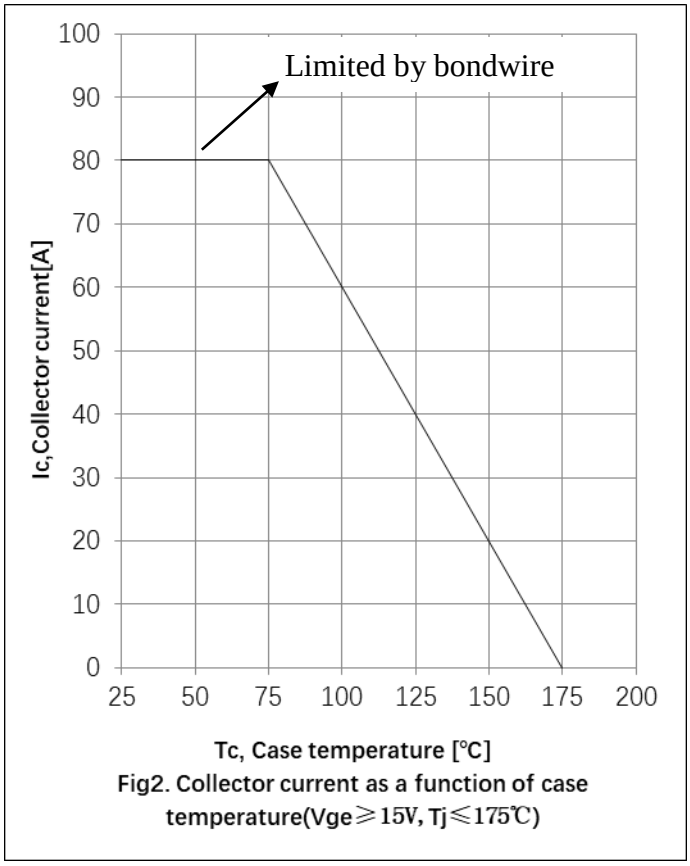


Fig2. Collector current as a function of case temperature(Vge≥15V, Tj≤175℃)

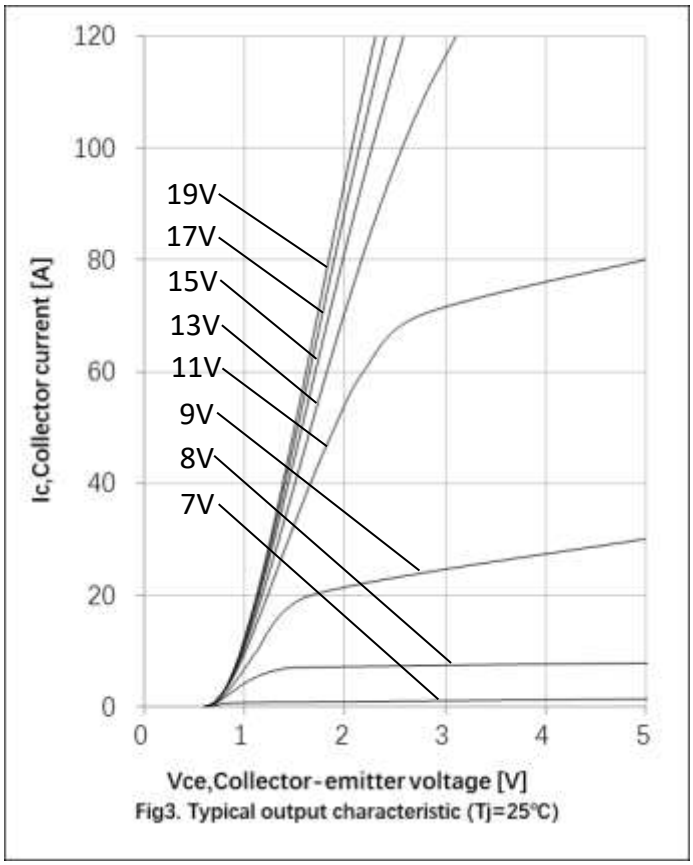


Fig3. Typical output characteristic (Tj=25℃)

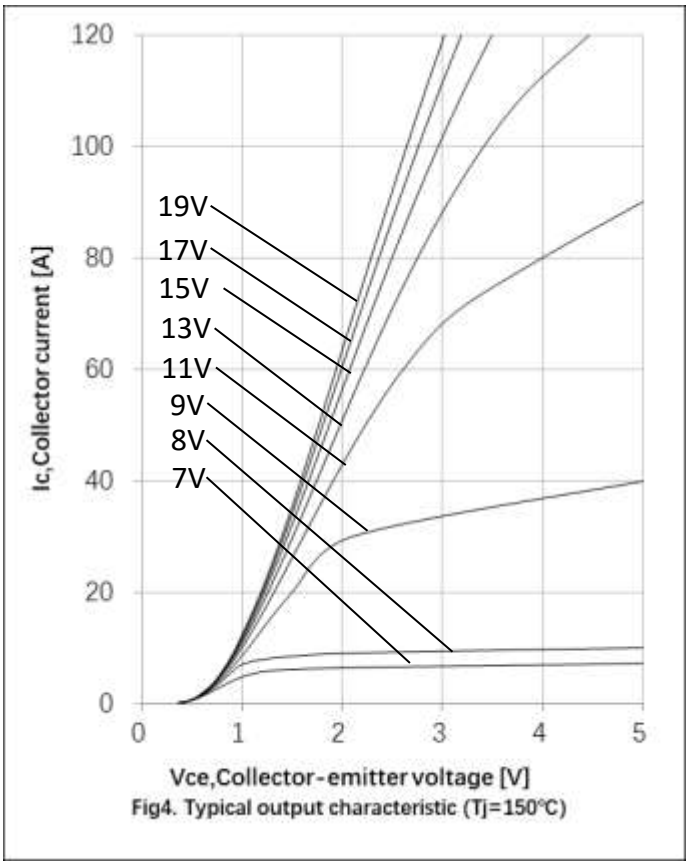


Fig4. Typical output characteristic (Tj=150℃)

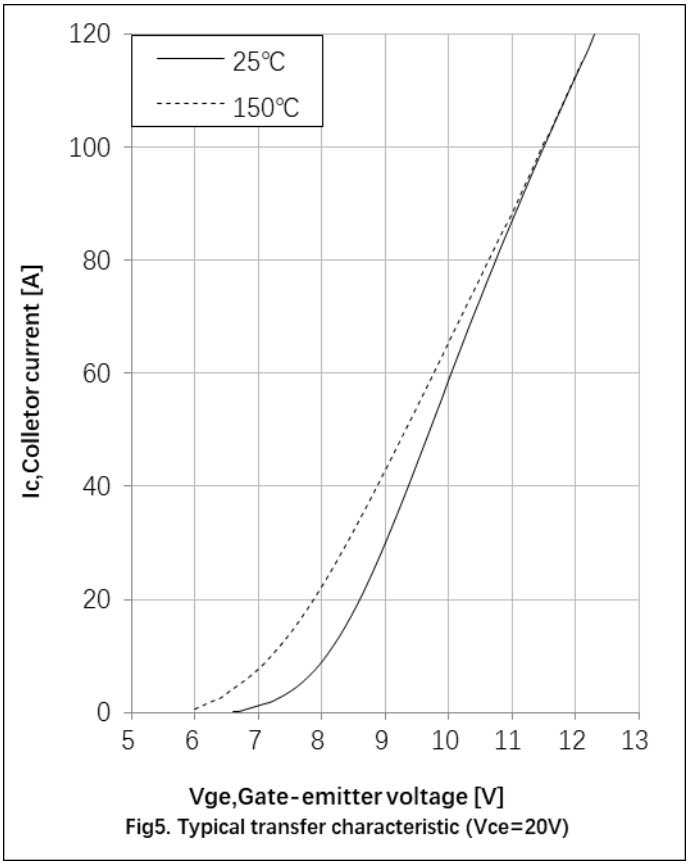


Fig5. Typical transfer characteristic (Vce=20V)

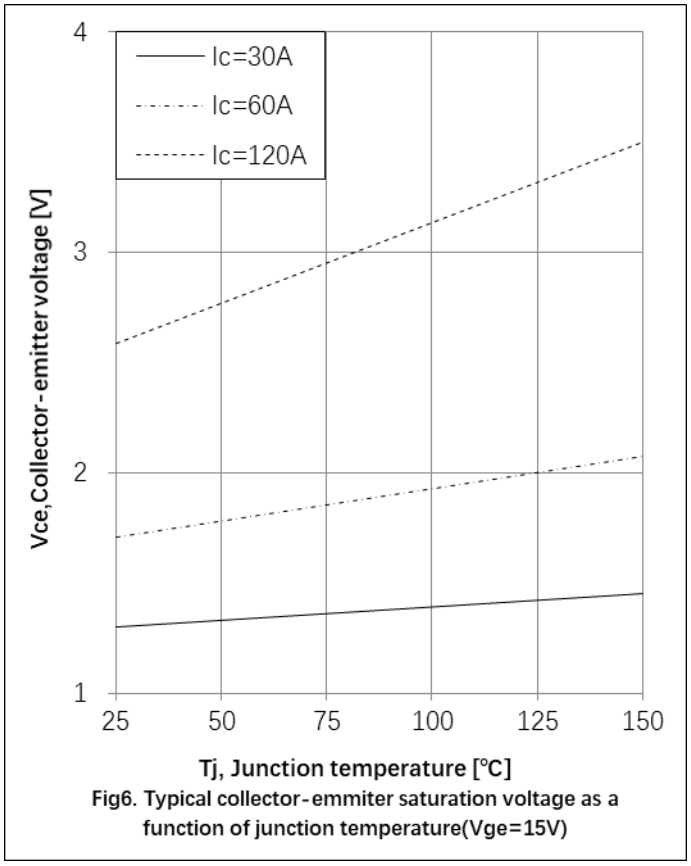


Fig6. Typical collector-emmiter saturation voltage as a function of junction temperature(Vge=15V)

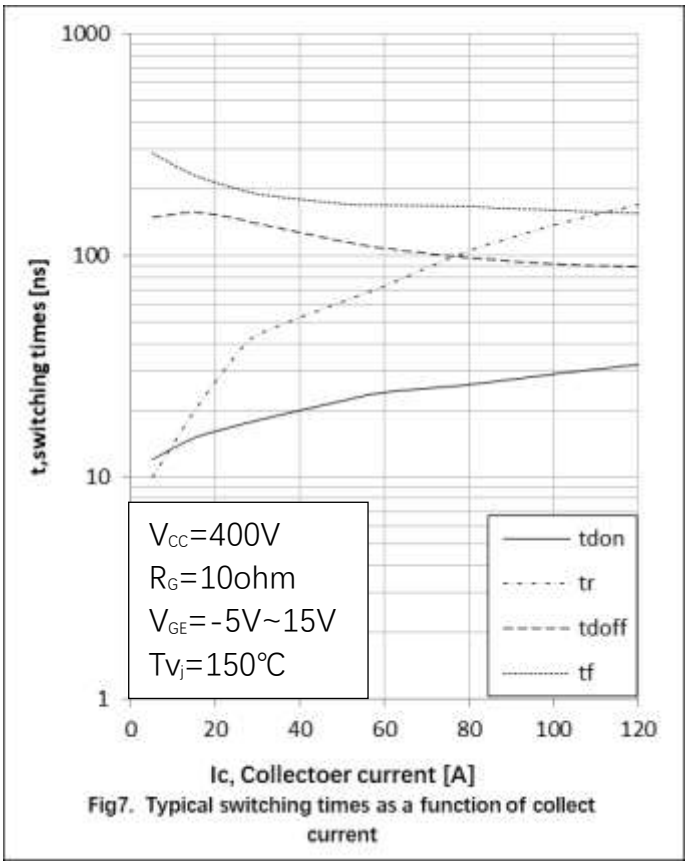


Fig7. Typical switching times as a function of collect current

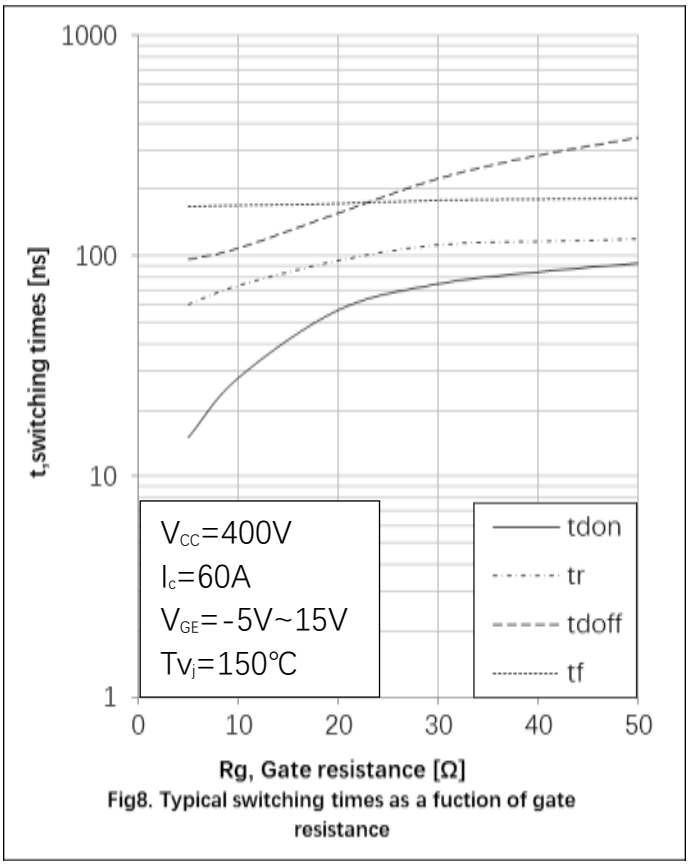


Fig8. Typical switching times as a fuction of gate resistance

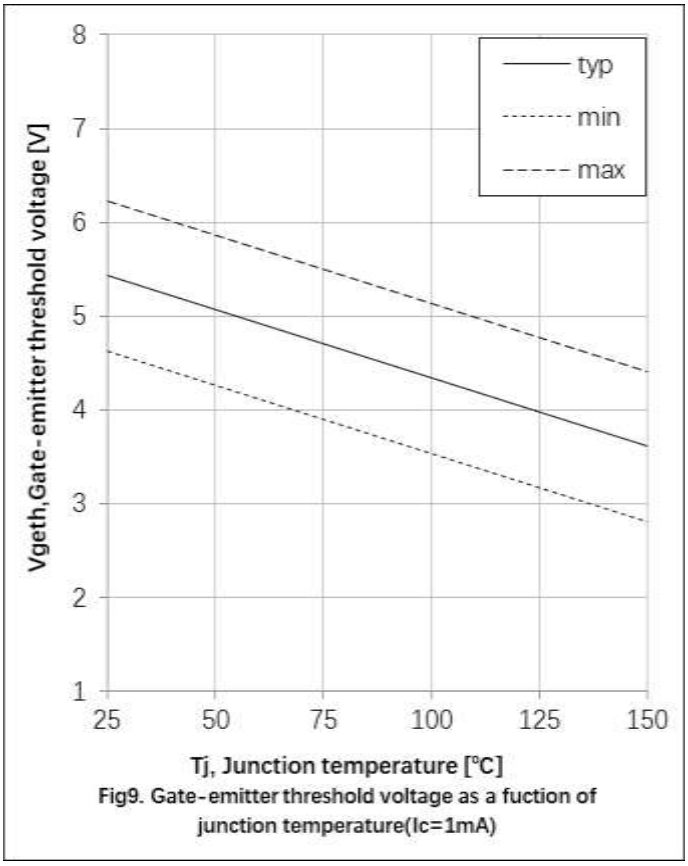


Fig9. Gate-emitter threshold voltage as a fuction of junction temperature(Ic=1mA)

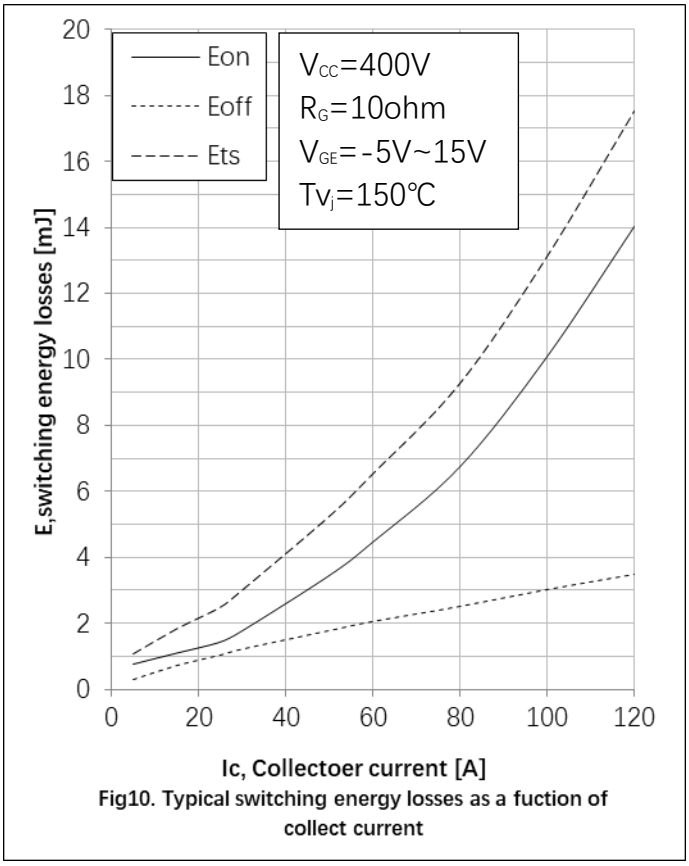


Fig10. Typical switching energy losses as a fuction of collect current

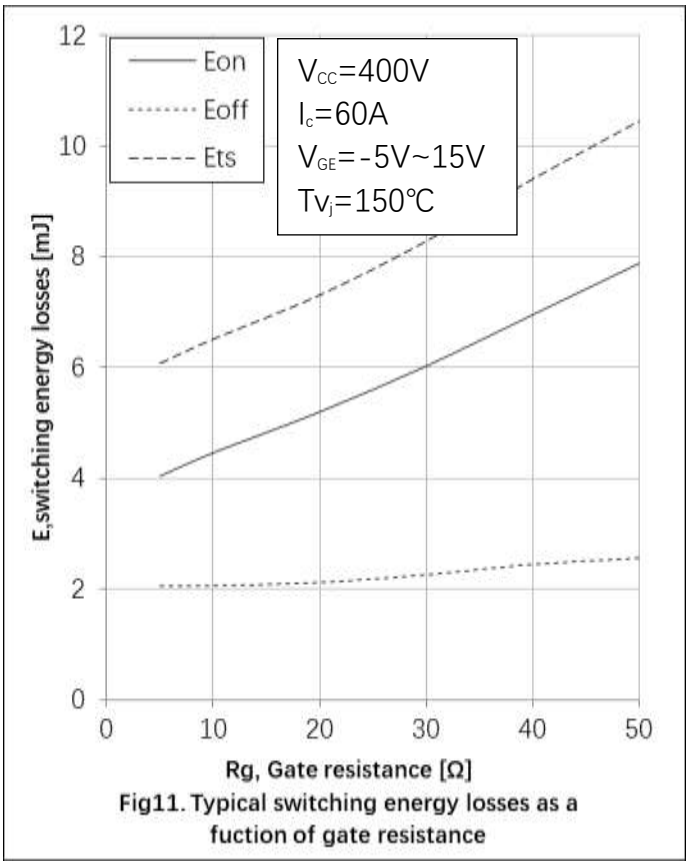


Fig11. Typical switching energy losses as a fuction of gate resistance

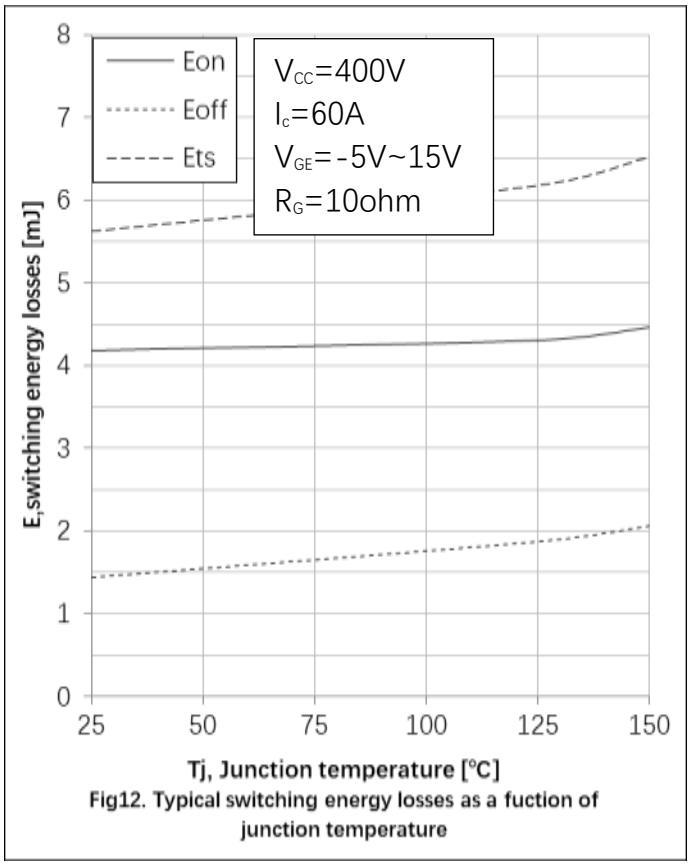


Fig12. Typical switching energy losses as a fuction of junction temperature

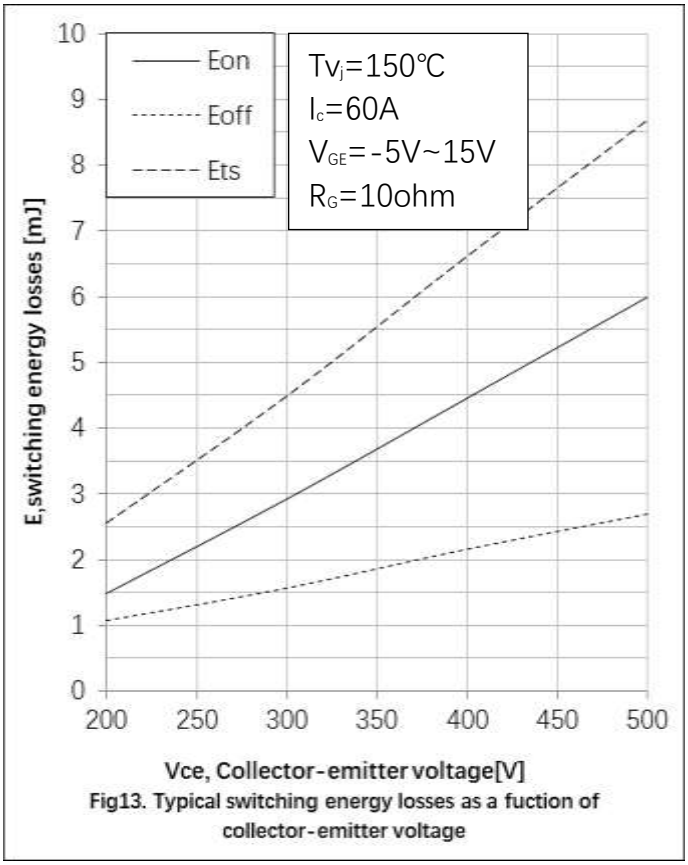


Fig13. Typical switching energy losses as a fuction of collector-emitter voltage

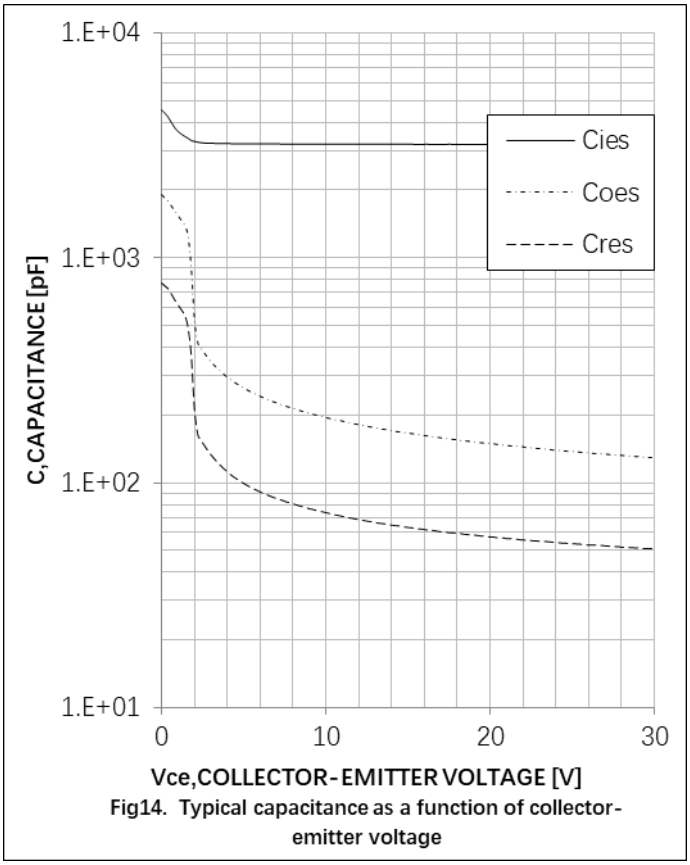


Fig14. Typical capacitance as a function of collector-emitter voltage

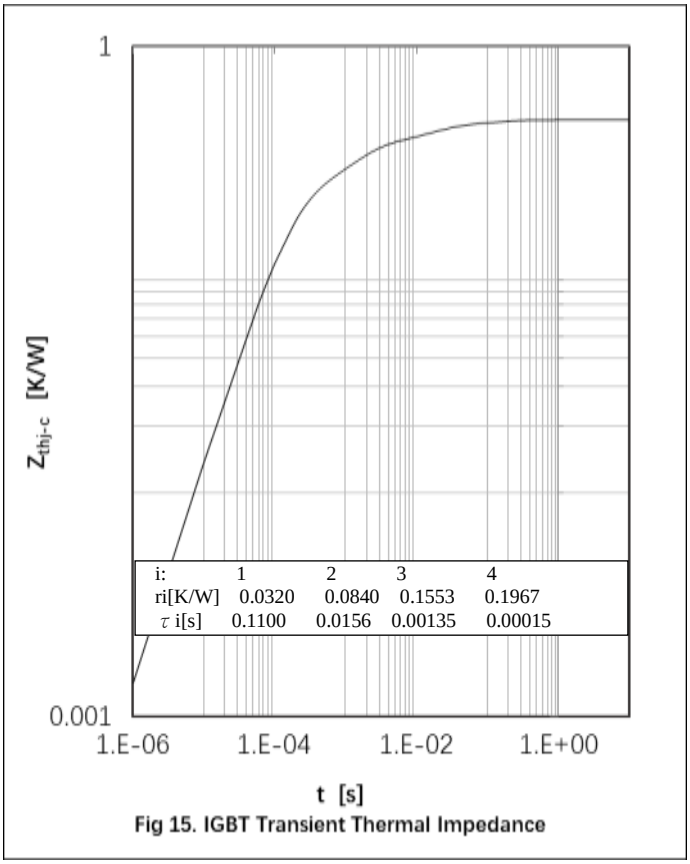


Fig 15. IGBT Transient Thermal Impedance

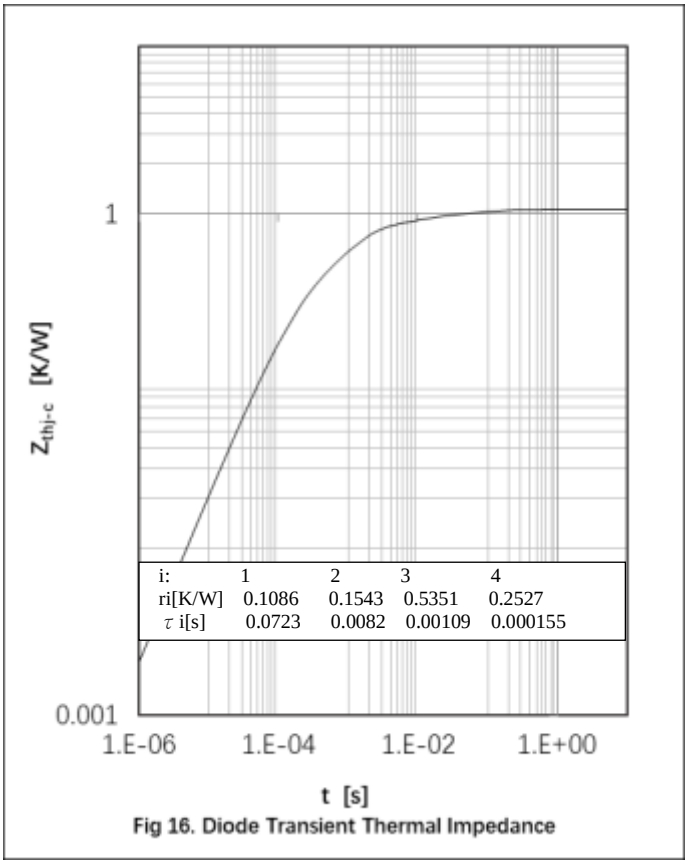


Fig 16. Diode Transient Thermal Impedance

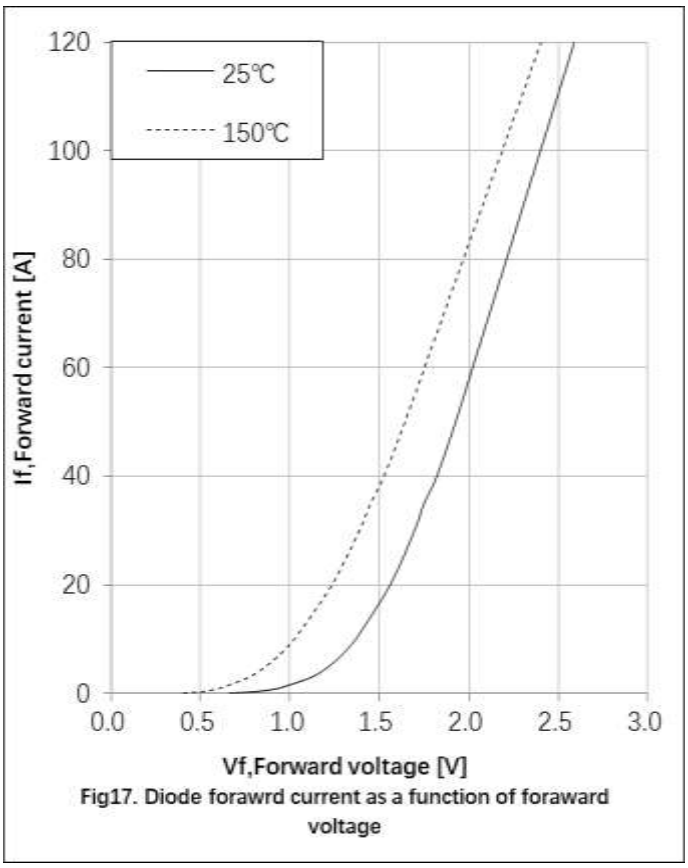


Fig17. Diode forawrd current as a function of foraward voltage

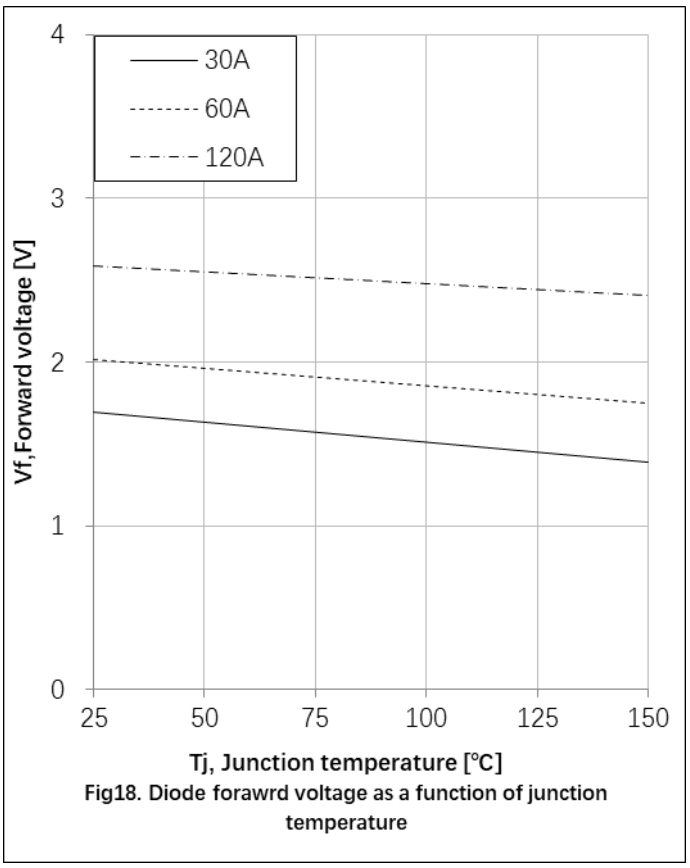
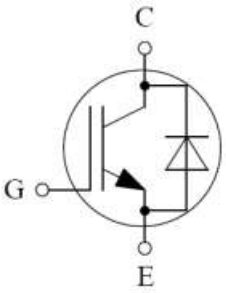


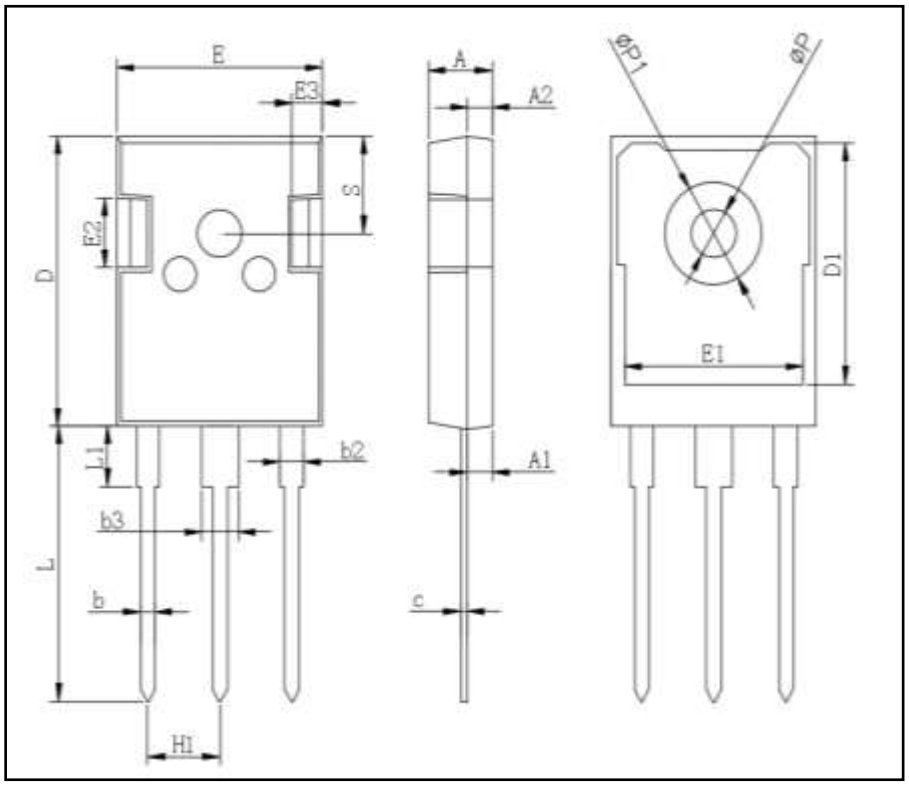
Fig18. Diode forawrd voltage as a function of junction temperature

Circuit Diagram



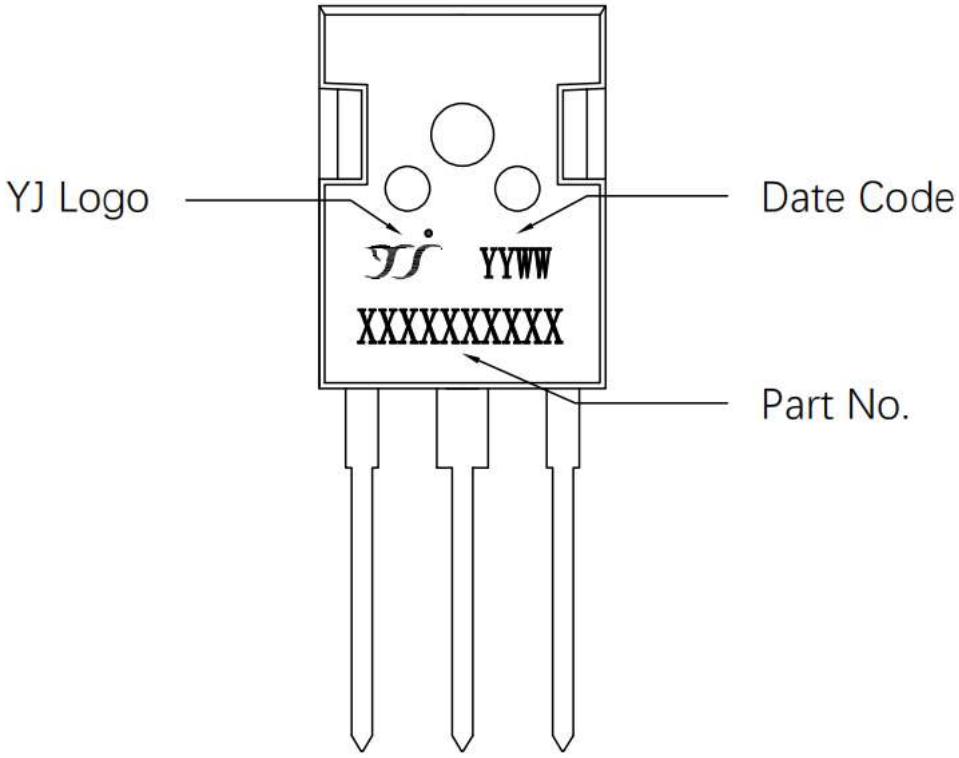


Package Outline Information



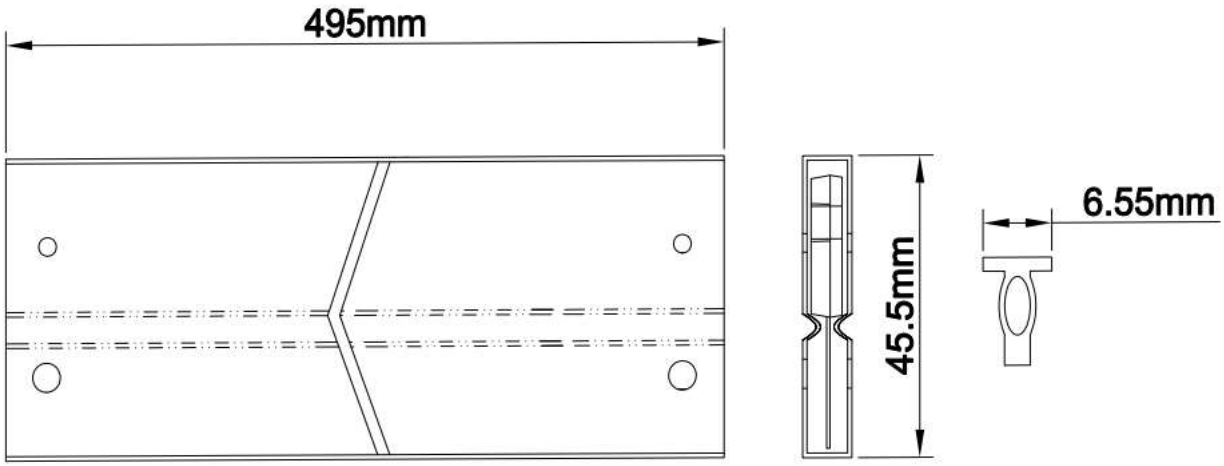
TO-247AB		
Dim	Min	Max
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.0	1.4
b2	1.91	2.21
C	0.5	0.7
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.0	13.6
E2	4.80	5.20
E3	2.30	2.70
L	19.62	20.22
L1	-	4.30
ΦP	3.40	3.80
ΦP1	-	7.30
S	6.15TYP	
H1	5.44TYP	
b3	2.80	3.20

Marking Information



Package Parameters

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
DGW60N65CTL1E	TO-247	Tube	30	DGW60N65CTL1E



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