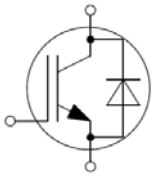
DGW20N60CTL

RoHS COMPLIANT

IGBT Modules

V_{CE}	600	V
I_C	20	A
$V_{CE(SAT)}$ I_C=20A	1.9	V

Circuit



Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175℃
- Positive temperature coefficient
- High ruggedness, temperature stable
- Pb-free lead plating; RoHS compliant

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	600	V
DC Collector Current, limited by T_{jmax} T_C= 25°C T_C= 100°C	I_C	 40 20	A
Diode Forward Current, limited by T_{jmax} T_C= 25°C T_C= 100°C	I_F	 40 20	A
Continuous Gate-Emitter Voltage	V_{GE}	±20	V
Transient Gate-Emitter Voltage	V_{GE}	±30	V
Turn off Safe Operating Area V_{CE}≤600V, T_j≤ 150°C		80	A
Pulsed Collector Current, V_{GE}=15V, tp limited by T_{jmax}	I_{CM}	80	A
Short Circuit Withstand Time, VGE= 15V, VCE≤ 400V	Tsc	5	μs
Diode Pulsed Current, tp limited by T_{jmax}	I_{Fpuls}	80	A
Power Dissipation , Tj=175°C,Tc=25°C	P_{tot}	166	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=1mA	600		-	V
Gate Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=250μA	4.1	5.0	5.7	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=20A T_j=25°C, T_j=125°C T_j=150°C		1.90 2.25 2.35	2.20	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=600V, V_{GE}=0V T_j= 25°C, T_j=150°C			0.25	mA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}= 0V, V_{GE}= ± 20V			±200	nA
Transconductance	gfs	V_{CE}=20V, I_C=20A		10		S

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V, f = 1MHz	-	0.99	-	nF
Output capacitance	C_{oes}			0.056		
Reverse Transfer Capacitance	C_{res}		-	0.03	-	
Gate Charge	Q_G	V_{CC}=480V,I_C=20A, V_{GE}=15V	-	0.052	-	uC
Short circuit collector current	$I_{C(SC)}$	V_{GE}=15V,t_{SC}≤5us V_{CC}=400V, $T_{j,\ start}$=25°C	-	98	-	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= 20A T_j= 25°C, T_j= 125°C T_j= 150°C		1.90 1.85 1.85		V

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=25°C V_{CC}= 400V, I_C=20A, V_{GE}=0/15V, Rg=12 Ω	-	13	-	ns
Rise Time	t_r		-	20	-	ns
Turn-on Energy	E_{on}		-	1.0	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	60	-	ns
Fall Time	t_f		-	40	-	ns
Turn-off Energy	E_{off}		-	0.2	-	mJ
Dynamic , at T_j= 125℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=25°C V_{CC}= 400V, I_C=20A, V_{GE}=0/15V, Rg=12 Ω	-	22	-	ns
Rise Time	t_r		-	25	-	ns
Turn-on Energy	E_{on}		-	1.44	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	90	-	ns
Fall Time	t_f		-	48	-	ns
Turn-off Energy	E_{off}		-	0.25	-	mJ
Dynamic , at T_j= 150℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=25°C V_{CC}= 400V, I_C=20A, V_{GE}=0/15V, Rg=12 Ω	-	24	-	ns
Rise Time	t_r		-	28	-	ns
Turn-on Energy	E_{on}		-	1.68	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	95	-	ns
Fall Time	t_f		-	53	-	ns
Turn-off Energy	E_{off}		-	0.28	-	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= 20A VR = 400V, -di/dt =300A/μs	-	15	-	A
Reverse Recovery Charge	Q_{rr}		-	0.6	-	uC
Reverse Recovery Energy	Erec		-	0.72		mJ
Dynamic , at Tj= 125℃						
Reverse Recovery Current	I_{rr}	I_F= 20A VR = 400V, -di/dt =300A/μs	-	20	-	A
Reverse Recovery Charge	Q_{rr}		-	1.1	-	uC
Reverse Recovery Energy	Erec		-	1.35		mJ
Dynamic , at Tj= 150℃						
Reverse Recovery Current	I_{rr}	I_F= 20A VR = 400V, -di/dt =300A/μs	-	22	-	A
Reverse Recovery Charge	Q_{rr}		-	1.3	-	uC
Reverse Recovery Energy	Erec		-	1.50		mJ

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R_{th}(j-c)	0.9	K/W
Diode Thermal Resistance, Junction - Case	R_{th}(j-c)	1.5	K/W
Thermal Resistance, Junction - Ambient	R_{th}(j-a)	40	K/W

Fig. 1 FBSOA characteristics

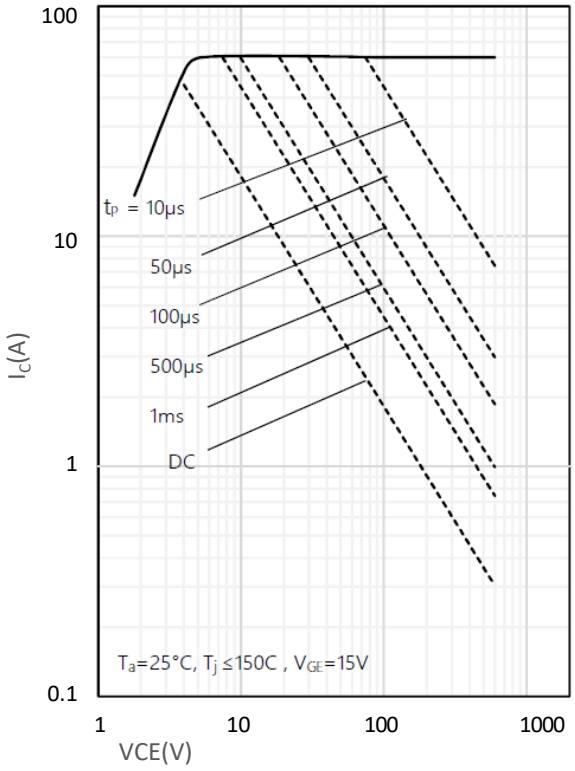


Fig. 2 Load Current vs. Frequency

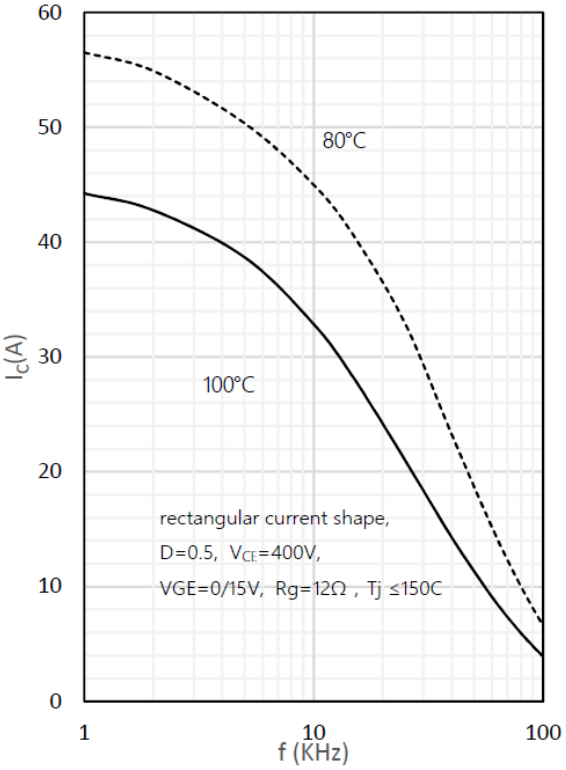


Fig. 3 Output characteristics

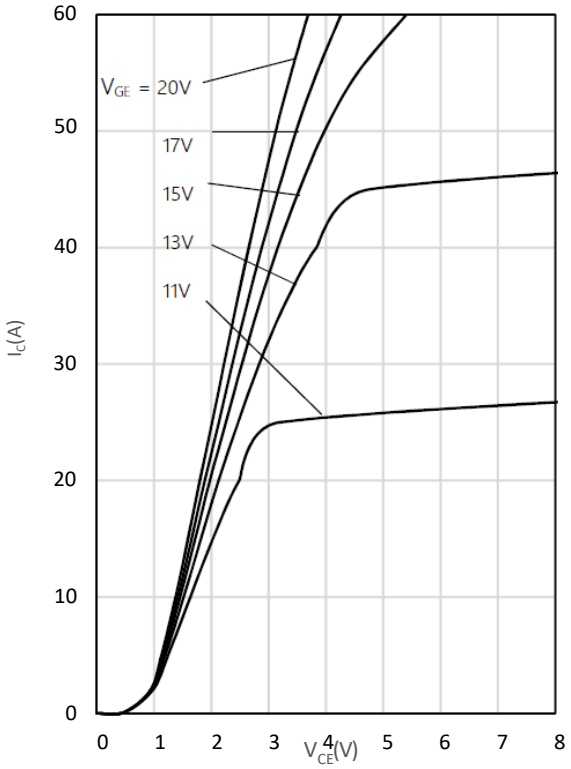


Fig. 4 Saturation voltage characteristics

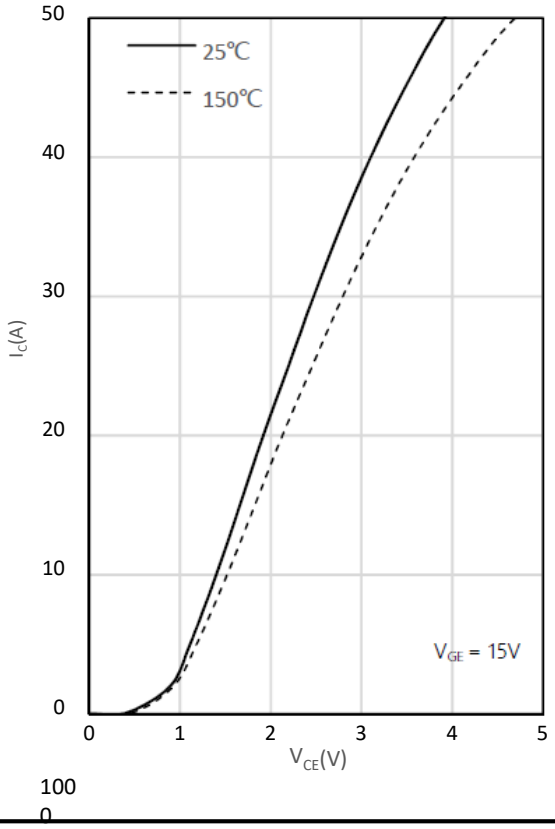


Fig. 5 Switching times vs. gate resistor

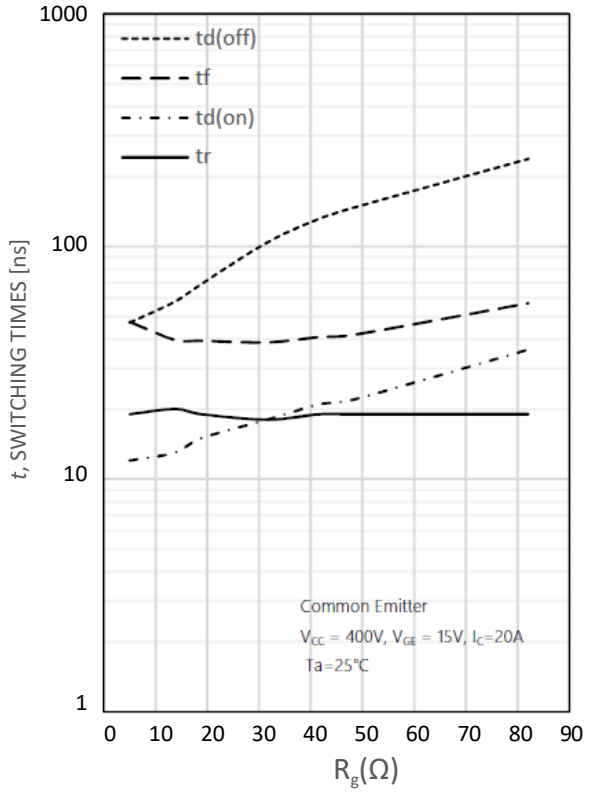


Fig. 6 Switching times vs. collector current

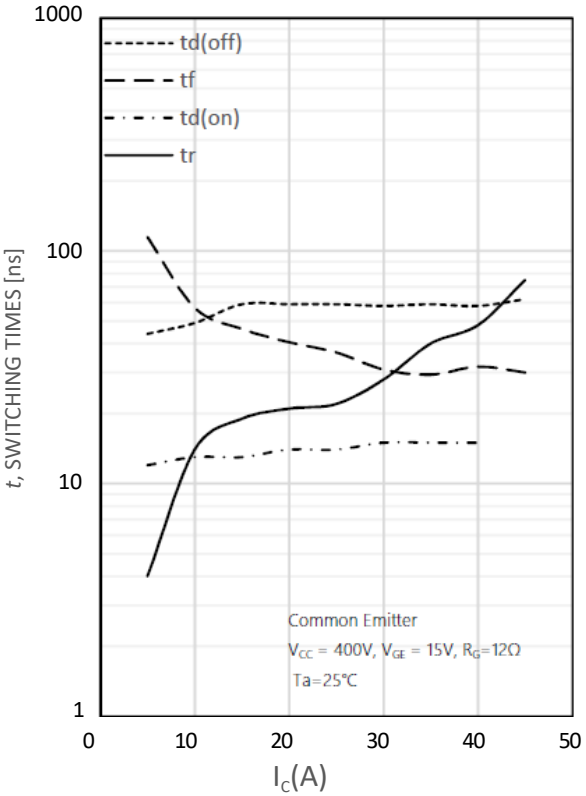


Fig. 7 Switching loss vs. gate resistor

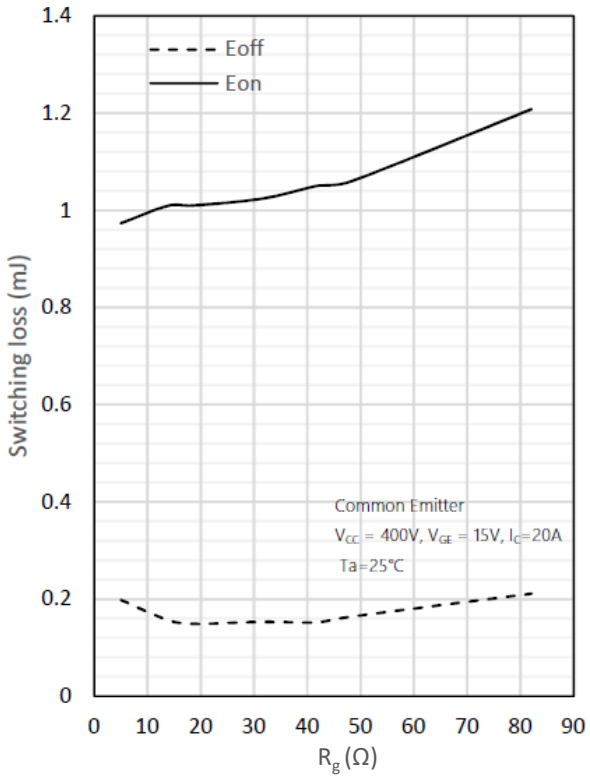


Fig. 8 Switching loss vs. cllector current

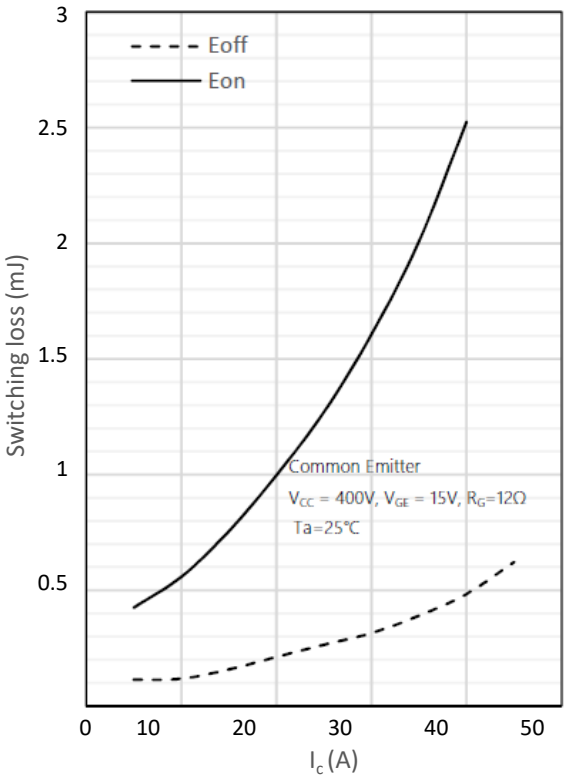


Fig. 9 Gate charge characteristics

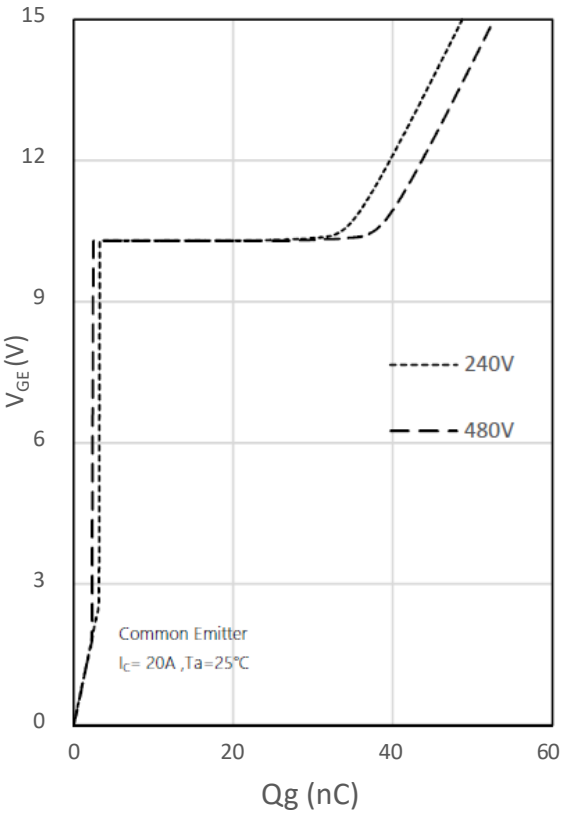
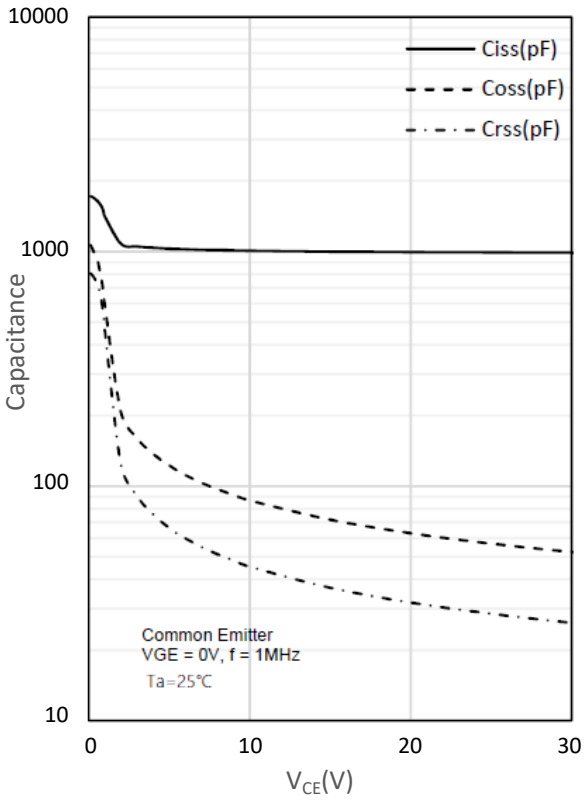
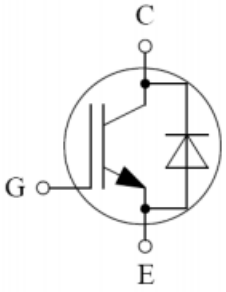


Fig. 10 Capacitance characteristics



- Circuit Diagram



- **Package Outline Information**

CASE: TO 247