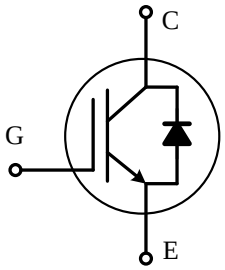
YGW100N65FSA1

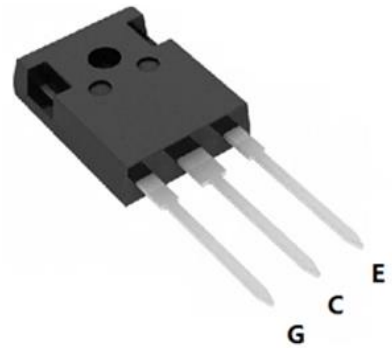
650V /100A Trench Field Stop IGBT

V_{CE}	**650**	**V**
I_C	**100**	**A**
$V_{CE(SAT)}$ I_C=100A	**1.95**	**V**

FEATURES

- High breakdown voltage to 650V for improved reliability
- Trench-Stop Technology offering :
  - ➢ High speed switching
  - ➢ High ruggedness, temperature stable
  - ➢ Short circuit withstand time – 5μs
  - ➢ Low V_{CEsat}
  - ➢ Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}





APPLICATION

- Uninterruptible Power Supplies
- Inverter
- Welding Converters
- PFC applications
- Converter with high switching frequency

Product	Package	Packaging
YGW100N65FSA1	TO247	Tube

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 T_C = 100°C	I_C	 200 100	A
Diode Forward current, limited by T_{jmax} T_C = 25°C T_C = 100°C	I_F	 150 75	A
Continuous Gate-emitter voltage	V_{GE}	±20	V
Transient Gate-emitter voltage (t_p≤10μs,D＜0.01)	V_{GE}	±30	V
Turn off safe operating area V_{CE} ≤1200V, T_j ≤ 150°C	-	300	A
Pulsed Collector Current, V_{GE} =15V, t_p limited by T_{jmax}	I_{CM}	300	A
Diode Pulsed Current, t_p limited by T_{jmax}	I_{Fpuls}	225	A
Short Circuit Withstand Time, V_{GE}= 15V, V_{CE}≤ 600V ,T_j=25℃	T_{sc}	5	μs
Power dissipation , T_C=25°C	P_{tot}	500	W
Max. Junction Temperature （Under switching conditions）	T_{Jmax}	175	°C
Operating junction temperature	T_{Jop}	-40...+150	°C
Storage temperature	T_s	-55...+175	°C
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s	-	260	°C

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT thermal resistance, junction - case	R_{θ}(j-c)	0.32	K/W
Diode thermal resistance, junction - case	R_{θ}(j-c)	0.8	K/W
Thermal resistance, junction - ambient	R_{θ}(j-a)	40	K/W

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=250μA	4.3	5.3	6.2	V
Collector-Emitter Saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=100A T_j = 25°C T_j = 175°C	- -	1.95 2.46	2.3 -	V
Zero gate voltage collector current	I_{CES}	V_{CE} = 1200V, V_{GE} = 0V T_j = 25°C T_j = 150°C	- -	- -	250 2500	μA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V	-	-	100	nA
Transconductance	g_{fs}	V_{CE}=20V, I_C=15A	-	40	-	S

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input capacitance	C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	4780	-	pF
Output capacitance	C_{oes}		-	264	-	
Reverse transfer capacitance	C_{res}		-	28	-	
Gate charge total	Q_g	V_{CC} = 520V, I_C = 100A, V_{GE} = 15V	-	255	-	nC
Gate to emitter charge	Q_{ge}			37.5		
Gate to collector charge	Q_{gc}			36.5		
Short circuit collector current	$I_{C(SC)}$	V_{GE}=15V,t_{SC}≤5us V_{CC}=400V, $T_{j,\ start}$=25°C	-	500	-	A

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Turn-on Delay Time	$t_{d(on)}$	T_j=25°C , V_{CC} = 400V, I_C = 100A, V_{GE} = 0/15V, R_g=10Ω	-	46	-	ns
Rise Time	t_r		-	154	-	ns
Turn-off Delay Time	$t_{d(off)}$		-	129	-	ns
Fall Time	t_f		-	130	-	ns
Turn-on Energy	E_{on}		-	5.4	-	mJ
Turn-off Energy	E_{off}		-	3.5	-	mJ
Turn-on Delay Time	$t_{d(on)}$	T_j=175°C , V_{CC} = 400V, I_C = 100A, V_{GE} = 0/15V, R_g=10Ω	-	42	-	ns
Rise Time	t_r		-	200	-	ns
Turn-off Delay Time	$t_{d(off)}$		-	152	-	ns
Fall Time	t_f		-	196	-	ns
Turn-on Energy	E_{on}		-	7.2	-	mJ
Turn-off Energy	E_{off}		-	5.5	-	mJ

Electrical Characteristics of the DIODE

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Diode Forward Voltage	V_{FM}	I_F = 100A T_j=25℃ T_j=175℃	-	2.0 1.8	-	V
Reverse Recovery Time	T_{rr}	T_j=25℃	-	125	-	ns
Reverse Recovery Current	I_{rr}	I_F= 100A, V_R = 400V, di/dt =400A/μs	-	19.2	-	A
Reverse Recovery Charge	Q_{rr}		-	1.14	-	uC
Reverse Recovery Time	T_{rr}	T_j=175℃	-	201	-	ns
Reverse Recovery Current	I_{rr}	I_F= 100A, V_R = 400V, di/dt =400A/μs	-	42.5	-	A
Reverse Recovery Charge	Q_{rr}		-	5.0	-	uC

Fig. 1 Output characteristics

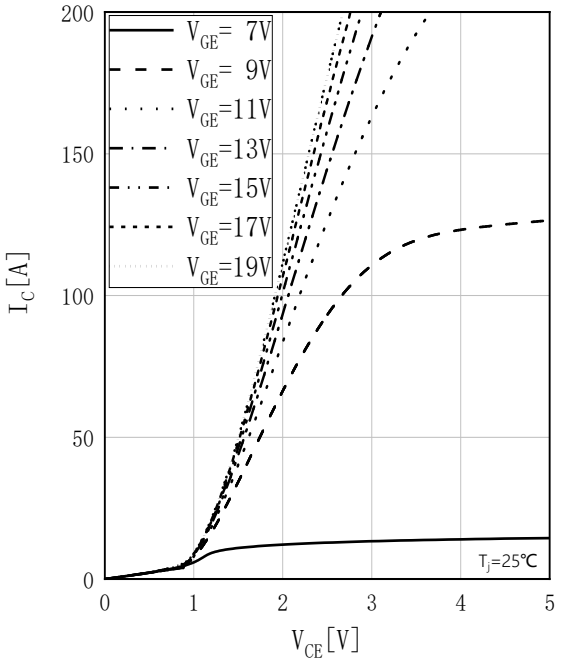


Fig. 2 Output characteristics

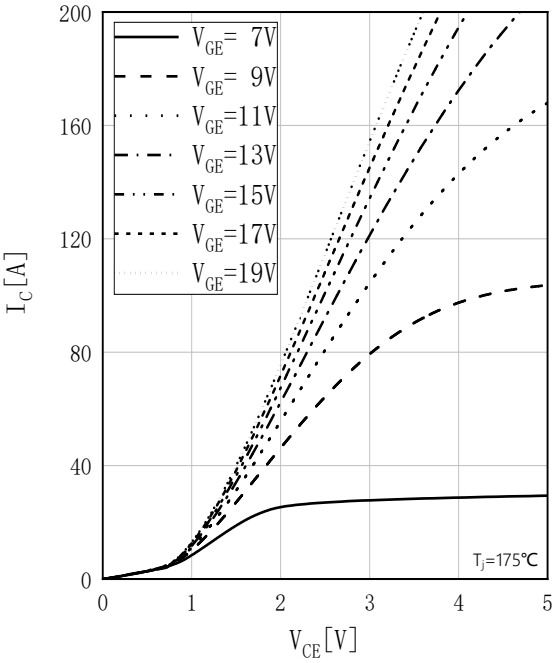


Fig. 3 Saturation voltage characteristics

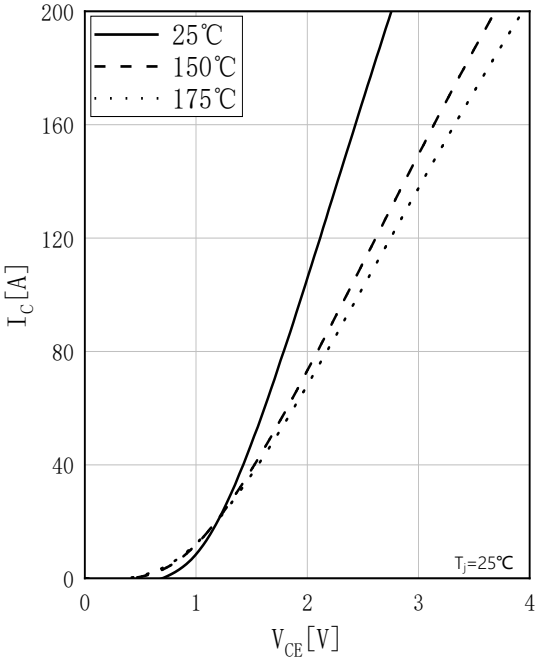


Fig. 4 Transfer characteristics

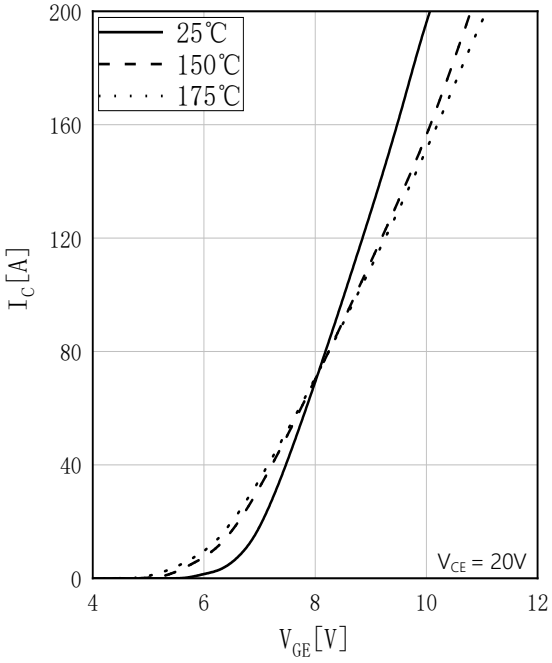


Fig. 5 Switching times vs. gate resistor

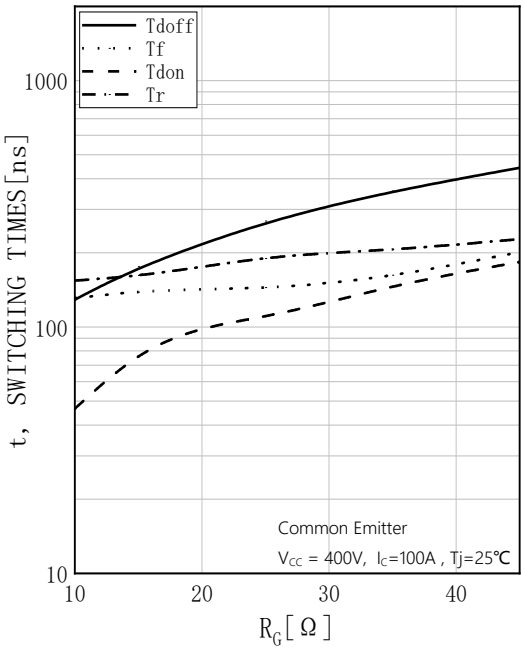


Fig. 6 Switching times vs. collector current

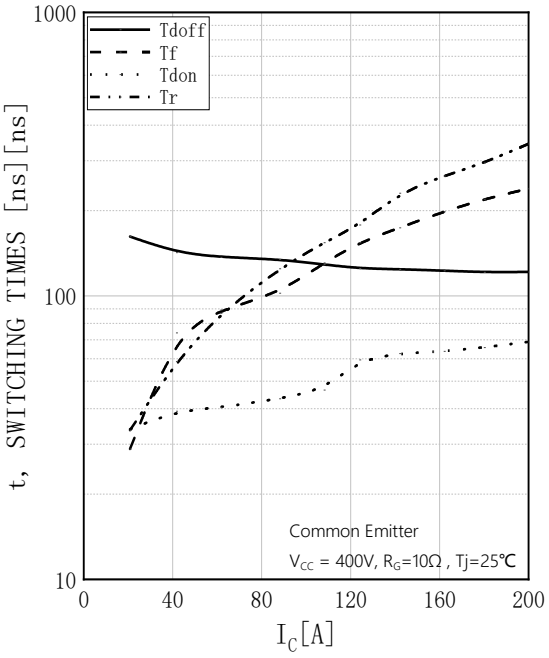


Fig. 7 Switching loss vs. gate resistor

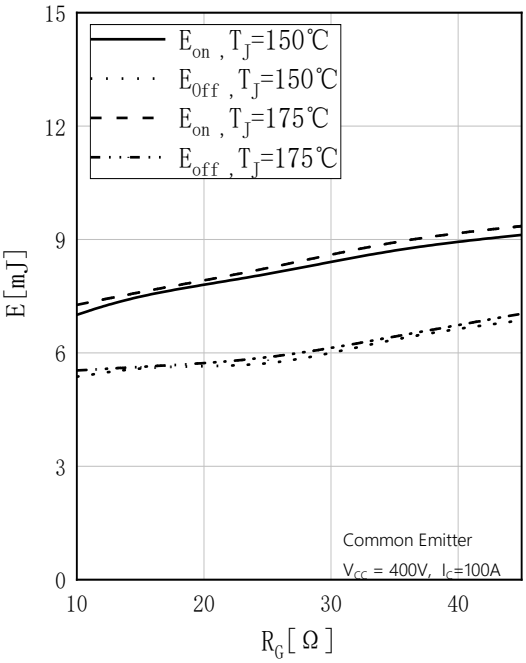


Fig. 8 Switching loss vs. collector current

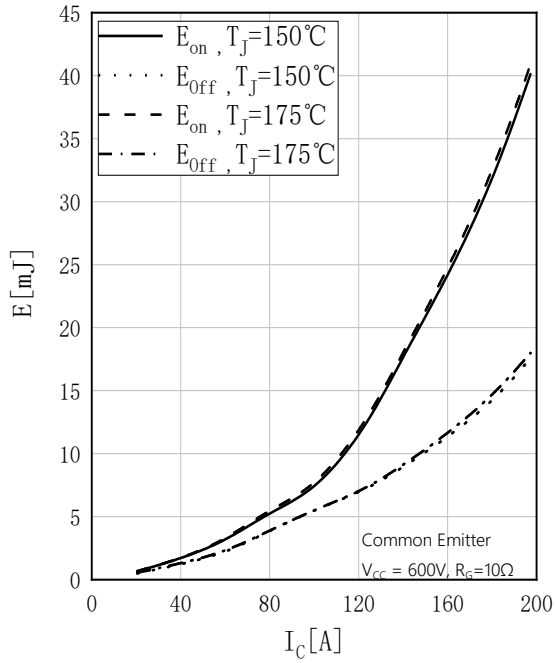


Fig.9 Capacitance characteristics

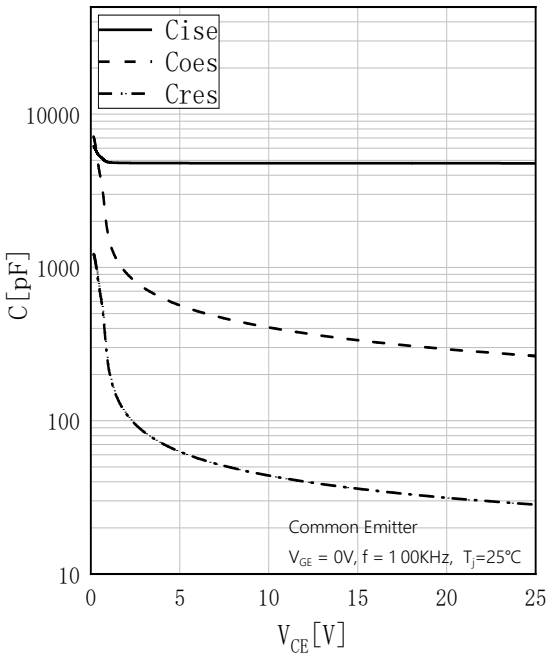


Fig. 10 Gate charge characteristics

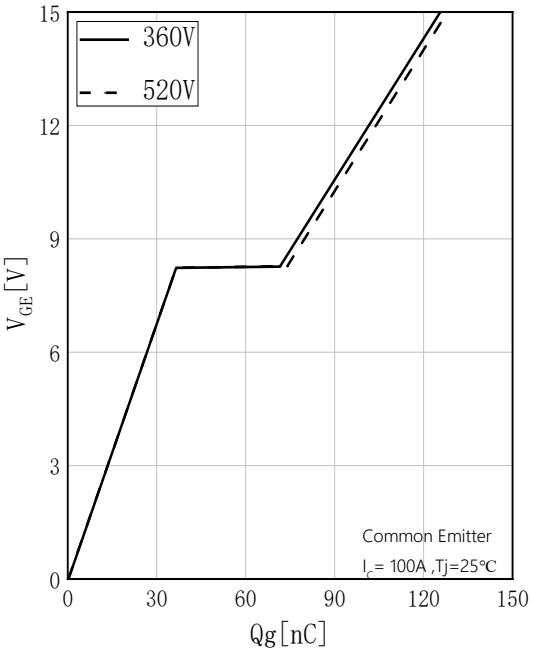


Fig.11 Diode forward current as a function of V_f

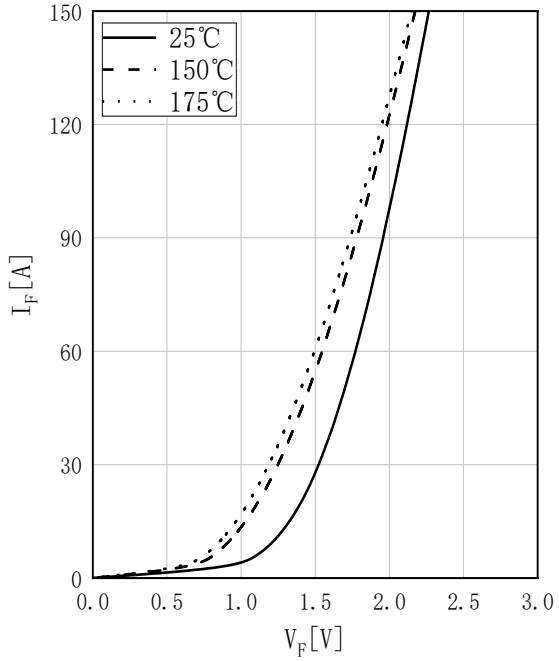
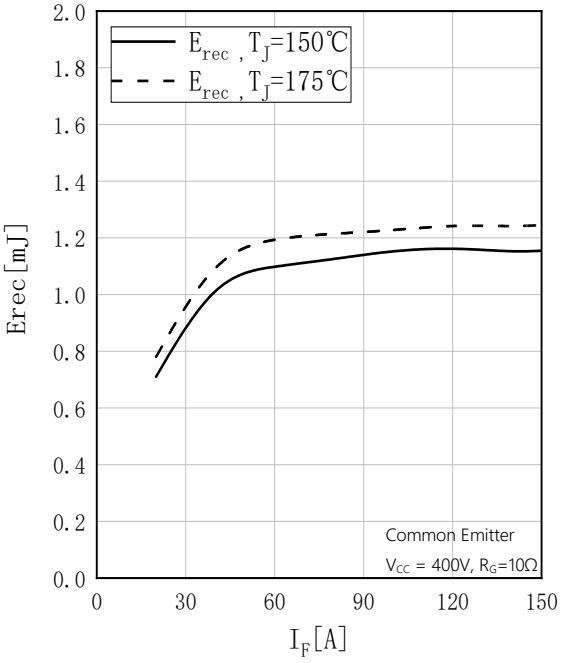
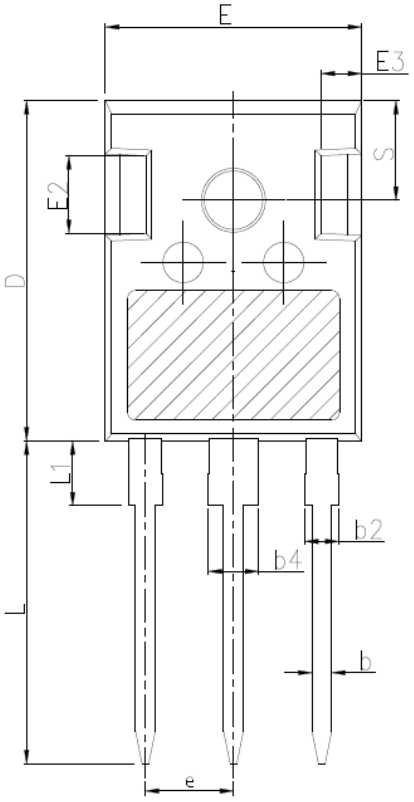
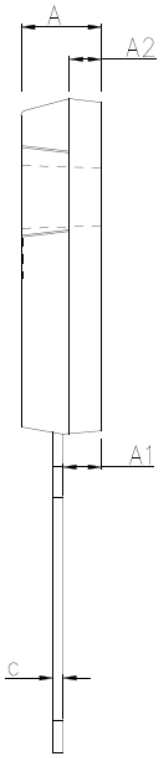


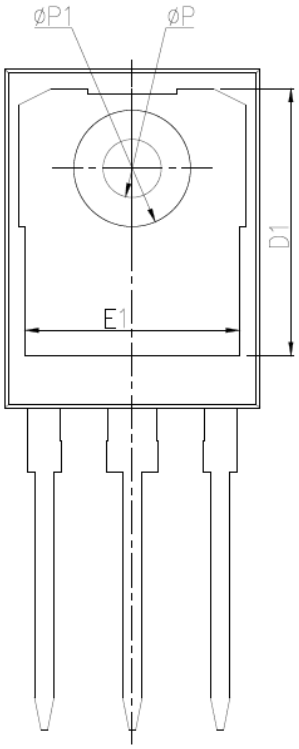
Fig. 12 Typical reverse energy loss vs. forward current



TO247 package information







COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.80	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.82	19.92	20.22
L1	–	–	4.30
ΦP	3.40	3.60	3.80
ΦP1	–	–	7.30
S	6.15BSC		