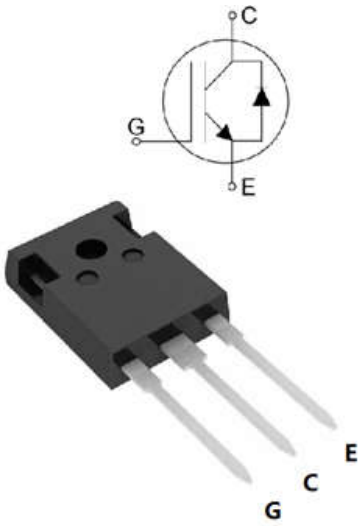
YGW60N65F1A2

650V /60A Trench Field Stop IGBT

V_{CE}	**650**	**V**
I_C	**60**	**A**
$V_{CE(SAT)}$ I_C=60A	**1.85**	**V**

FEATURES

- High breakdown voltage up to 650V for improved reliability
- Trench-Stop Technology offering :
  - High speed switching
  - High ruggedness, temperature stable
  - Low V_{CEsat}
  - Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- Enhanced avalanche capability



APPLICATION

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

Product	Package	Packaging
YGW60N65F1A2	TO247	Tube

Maximum Ratings （T_j= 25℃ unless otherwise specified）

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	 120 60	A
Diode Forward current, limited by T_{jmax} T_C = 25°C T_C = 100°C	I_F	 80 40	A
Continuous Gate-emitter voltage	V_{GE}	±20	V
Transient Gate-emitter voltage	V_{GE}	±30	V
Turn off safe operating area V_{CE} ≤650V, T_j ≤ 175°C	-	180	A
Pulse collector current, V_{GE} =15V, t_p limited by T_{jmax}	I_{CM}	180	A
Power dissipation , T_j=25°C	P_{tot}	312	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_S	-55...+175	°C
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s	-	260	°C
Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT thermal resistance, junction - case	$R_{\theta(j-c)}$	0.48	K/W
Diode thermal resistance, junction - case	$R_{\theta(j-c)}$	1.1	K/W
Thermal resistance, junction - ambient	$R_{\theta(j-a)}$	40	K/W

Electrical Characteristics （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=250uA	650	-	-	V
		V_{GE}=0V , I_C=1mA	650	-	-	V
Gate Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=250uA	4.0	5.0	6.0	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=60A T_j = 25°C T_j = 175°C	- -	1.85 2.55	2.2 -	V
Zero gate voltage collector current	I_{CES}	V_{CE} = 650V, V_{GE} = 0V T_j = 25°C T_j = 175°C	- -	0.1 -	40 4000	μA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} =±20V	-	-	100	nA
Transconductance	g_{fs}	V_{CE} = 20V, I_C = 60A	-	52	-	S

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Dynamic						
Input capacitance	C_{ies}	V_{CE} = 30V, V_{GE} = 0V, f = 1 MHz	-	3800	-	pF
Output capacitance	C_{oes}		-	130	-	
Reverse transfer capacitance	C_{res}		-	70	-	
Gate charge	Q_G	V_{CC} = 520V, I_C = 60A, V_{GE} = 15V	-	158	-	nC

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Dynamic T_j=25°C						
Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 400V, I_C = 60.0A, V_{GE} = 0.0/15.0V, R_g=12Ω	-	56	-	ns
Rise Time	t_r		-	79	-	ns
Turn-off Delay Time	$t_{d(off)}$		-	165	-	ns
Fall Time	t_f		-	81	-	ns
Turn-on Energy	E_{on}		-	2.2	-	mJ
Turn-off Energy	E_{off}		-	0.89	-	mJ

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Dynamic						
Diode Forward Voltage	V_{FM}	I_F = 40A	-	1.8	-	V
Reverse Recovery Time	T_{rr}	I_F= 60A, V_R = 400V, di/dt= 400A/μs,	-	90	-	ns
Reverse Recovery Current	I_{rr}		-	12	-	A
Reverse Recovery Charge	Q_{rr}		-	600	-	nC

Fig. 1 FBSOA characteristics

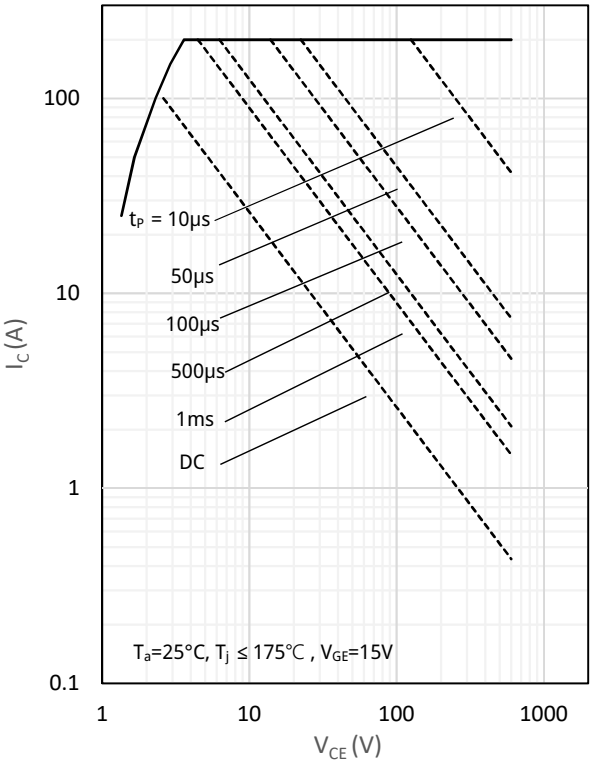


Fig. 2 Power dissipation as a function of T_C

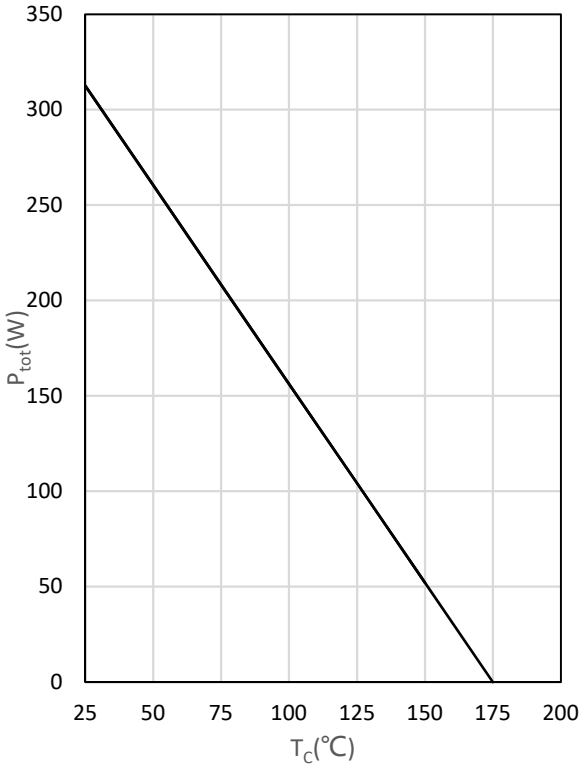


Fig. 3 Output characteristics

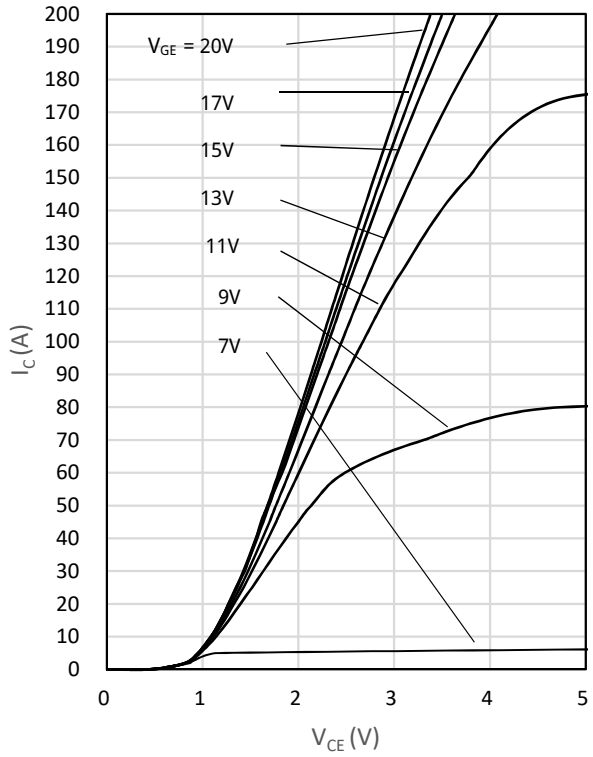


Fig. 4 Saturation voltage characteristics

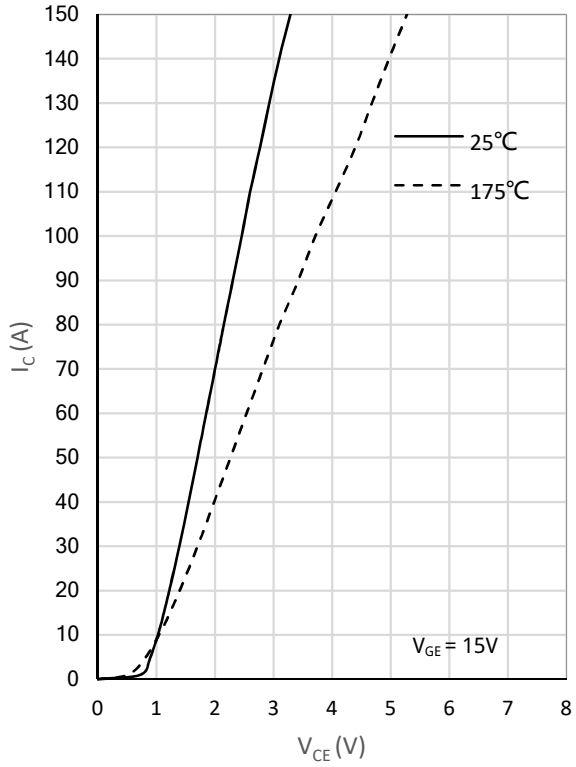


Fig. 5 Switching times vs. gate resistor

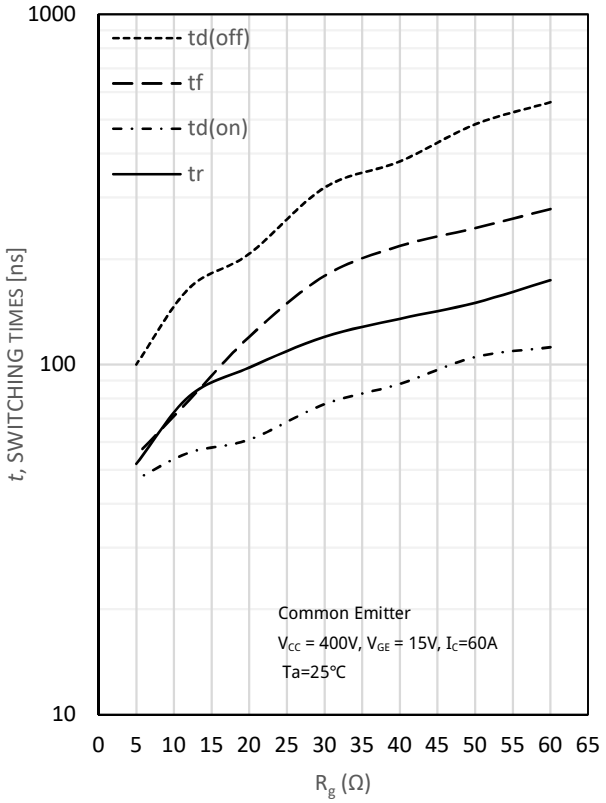


Fig. 6 Switching times vs. collector current

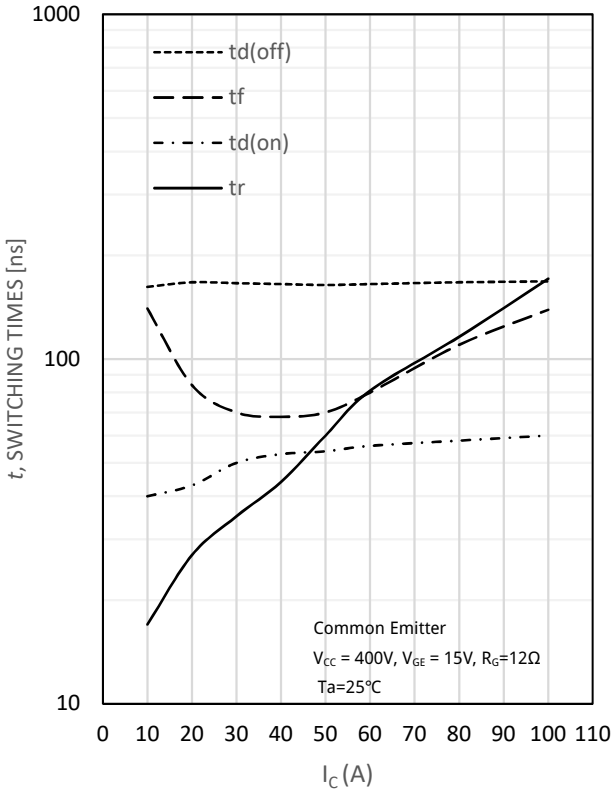


Fig. 7 Switching loss vs. gate resistor

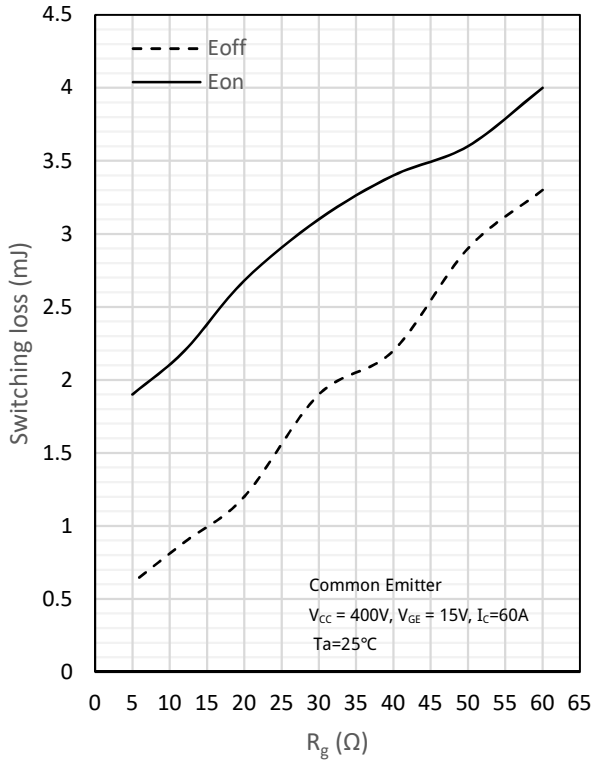


Fig. 8 Switching loss vs. collector current

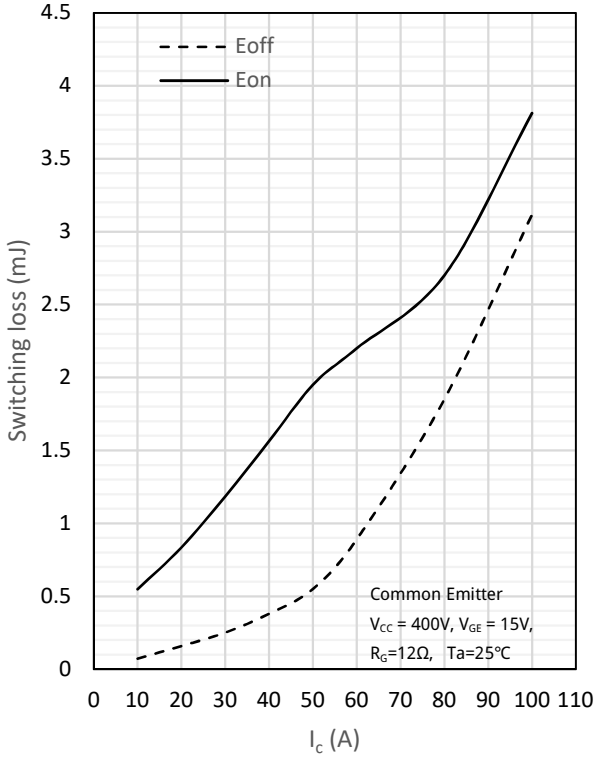


Fig. 9 Gate charge characteristics

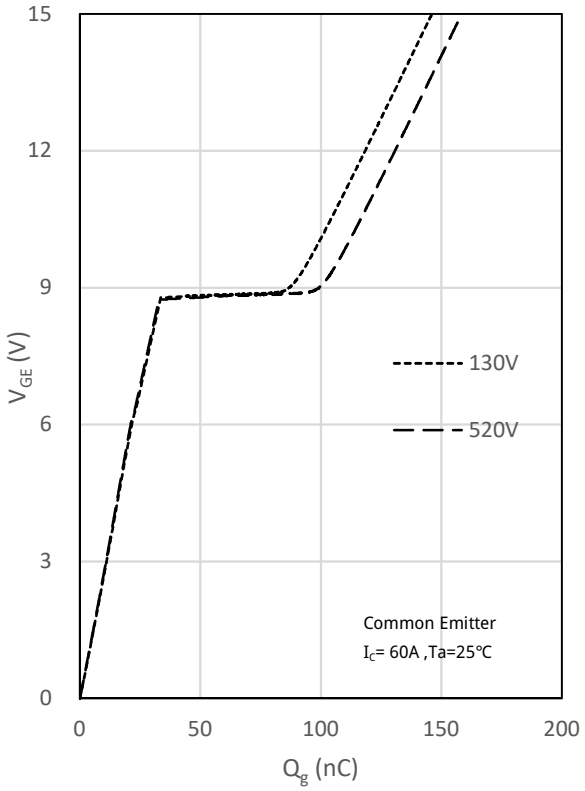
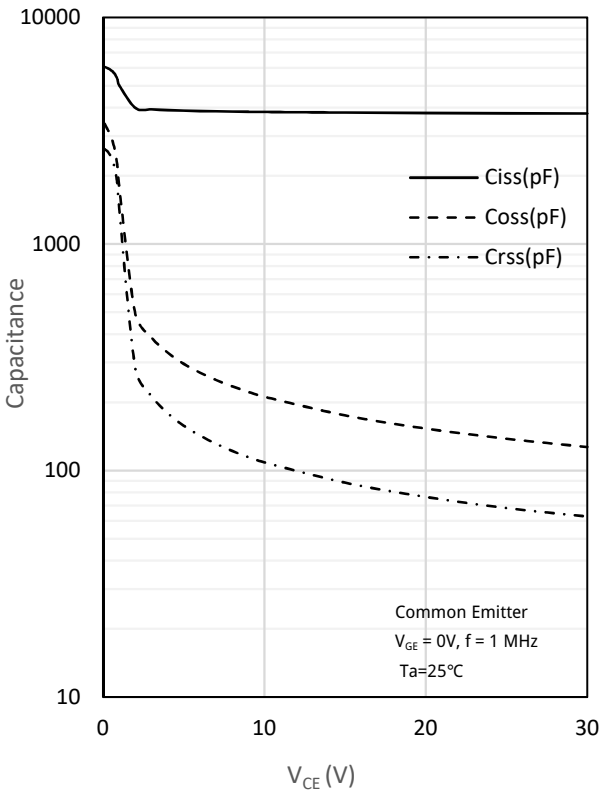
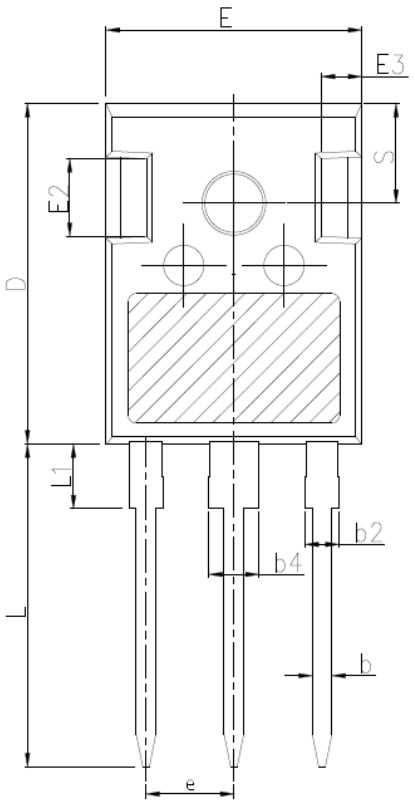
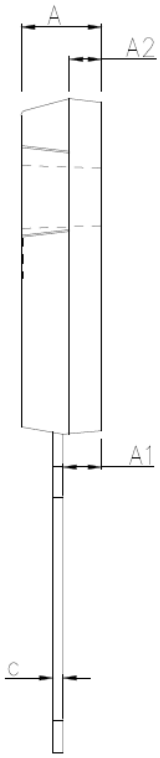


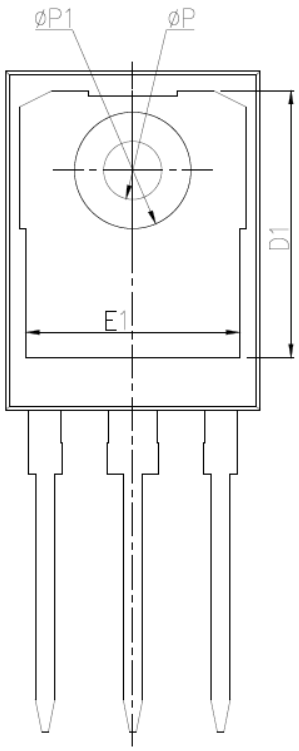
Fig. 10 Capacitance characteristics



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		