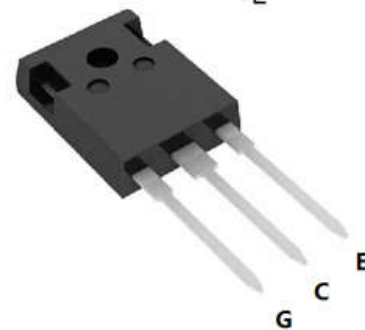
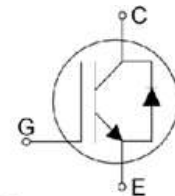


### FEATURES

- High breakdown voltage to 1200V for improved reliability
- Trench-Stop Technology offering :
  - High speed switching
  - High ruggedness, temperature stable
  - Short circuit withstand time – 10 $\mu$ s
  - Low  $V_{CEsat}$
  - Easy parallel switching capability due to positive temperature coefficient in  $V_{CEsat}$
- Enhanced avalanche capability

$V_{CE}$	1200	V
$I_C$	40	A
$V_{CE(SAT)} I_C=40A$	1.8	V



### APPLICATION

- Uninterruptible Power Supplies
- Solar inverter
- Welding
- PFC applications

Product	Package	Packaging
YGW40N120F2	TO247	Tube

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	$V_{CE}$	1200	V
DC collector current, limited by $T_{jmax}$ $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	$I_C$	80 40	A
Diode Forward current, limited by $T_{jmax}$ $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	$I_F$	80 40	A
Continuous Gate-emitter voltage	$V_{GE}$	$\pm 20$	V
Transient Gate-emitter voltage	$V_{GE}$	$\pm 30$	V
Turn off safe operating area $V_{CE} \leq 1200\text{V}$ , $T_j \leq 150^\circ\text{C}$	-	160	A
Pulsed Collector Current, $V_{GE} = 15\text{V}$ , $t_p$ limited by $T_{jmax}$	$I_{CM}$	160	A
Diode Pulsed Current, $t_p$ limited by $T_{jmax}$	$I_{Fpuls}$	160	A
Short Circuit Withstand Time, $V_{GE} = 15\text{V}$ , $V_{CE} \leq 600\text{V}$	$T_{sc}$	10	$\mu\text{s}$
Power dissipation, $T_j = 25^\circ\text{C}$	$P_{tot}$	417	W
Max. Junction Temperature (Under switching conditions)	$T_{Jmax}$	175	$^\circ\text{C}$
Operating junction temperature	$T_{Jop}$	-40...+150	$^\circ\text{C}$
Storage temperature	$T_s$	-55...+150	$^\circ\text{C}$
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s	-	260	$^\circ\text{C}$

**Thermal Resistance**

Parameter	Symbol	Max. Value	Unit
IGBT thermal resistance, junction - case	$R_{\theta(j-c)}$	0.3	K/W
Diode thermal resistance, junction - case	$R_{\theta(j-c)}$	0.6	K/W
Thermal resistance, junction - ambient	$R_{\theta(j-a)}$	40	K/W

**Electrical Characteristics of the IGBT** ( $T_j = 25^\circ\text{C}$  unless otherwise specified) :

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Collector-Emitter breakdown voltage	$BV_{CES}$ ①	$V_{GE}=0V, I_C=250\mu A$	1200	1300	-	V
Gate threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	5.2	5.9	6.5	V
Collector-Emitter Saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=40A$ $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	- -	1.8 2.3	2.3 -	V
Zero gate voltage collector current	$I_{CES}$	$V_{CE} = 1200V, V_{GE} = 0V$ $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	- -	- -	250 2500	$\mu A$
Gate-emitter leakage current	$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	100	nA
Transconductance	$g_{fs}$	$V_{CE}=20V, I_C=15A$	-	20	-	S

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Dynamic</b>						
Input capacitance	$C_{ies}$	$V_{CE} = 25V, V_{GE} = 0V,$ $f = 1\text{MHz}$	-	6400	-	pF
Output capacitance	$C_{oes}$		-	180	-	
Reverse transfer capacitance	$C_{res}$		-	90	-	
Gate charge	$Q_G$	$V_{CC} = 960V, I_C = 40A,$ $V_{GE} = 15V$	-	250	-	nC
Short circuit collector current	$I_{C(SC)}$	$V_{GE}=15V, t_{sc}\leq 10\mu s$ $V_{CC}=600V,$ $T_{j, start}=25^\circ\text{C}$	-	350	-	A

Note:

 ①  $BV_{ces}$  testing without filter could damage the device.  $BV_{ces}$  is guaranteed by  $I_{ces}@1200V$  test.

**Switching Characteristic, Inductive Load**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Dynamic , at <math>T_j = 25^\circ \text{C}</math></b>						
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{V}, I_C = 40\text{A},$ $V_{GE} = 0/15\text{V},$ $R_g = 10\Omega$	-	85	-	ns
Rise time	$t_r$		-	50	-	ns
Turn-on energy	$E_{on}$		-	4.3	-	mJ
Turn-off delay time	$t_{d(off)}$		-	200	-	ns
Fall time	$t_f$		-	70	-	ns
Turn-off energy	$E_{off}$		-	1.2	-	mJ

**Electrical Characteristics of the DIODE** ( $T_j = 25^\circ \text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Dynamic</b>						
Diode Forward Voltage	$V_{FM}$	$I_F = 40\text{A}$	-	3.5	-	V
Reverse Recovery Time	$T_{rr}$	$I_F = 40\text{A},$ $V_R = 600\text{V},$ $di/dt = 400\text{A}/\mu\text{s},$	-	190	-	ns
Reverse Recovery Current	$I_{rr}$		-	6	-	A
Reverse Recovery Charge	$Q_{rr}$		-	530	-	nC

Fig. 1 FBSOA characteristics

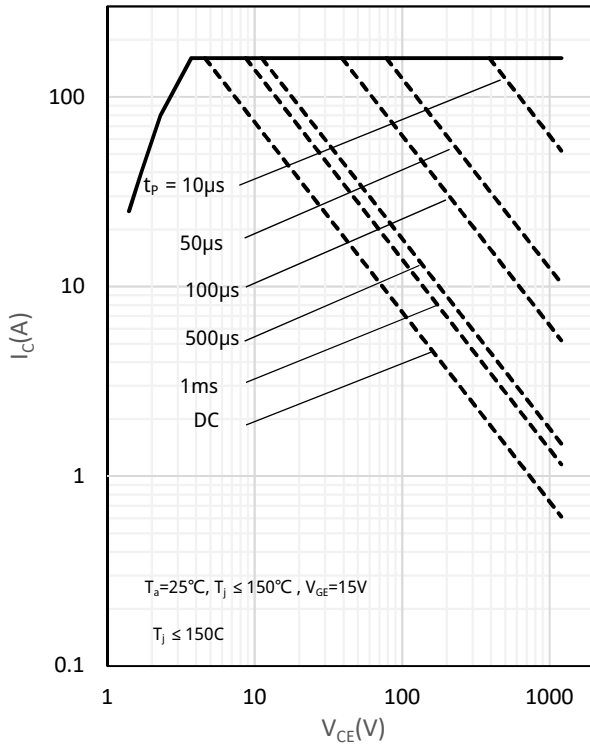


Fig. 2 Output characteristics

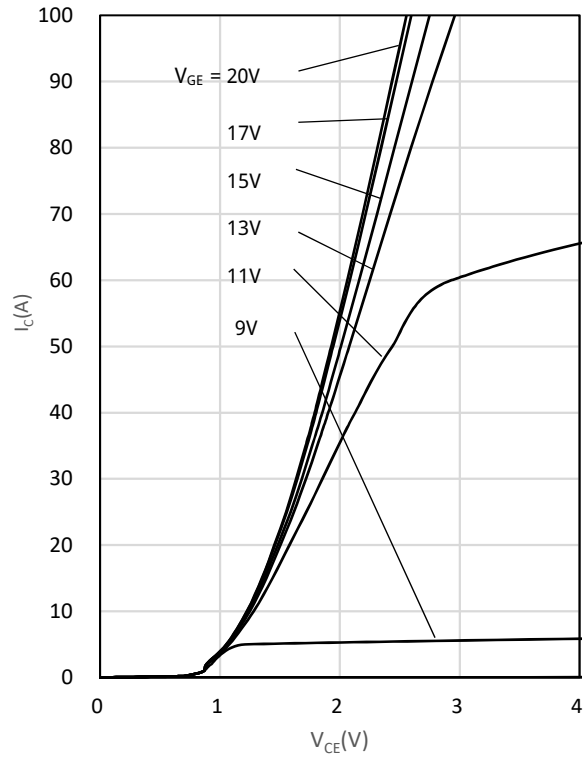


Fig. 3 Saturation voltage characteristics

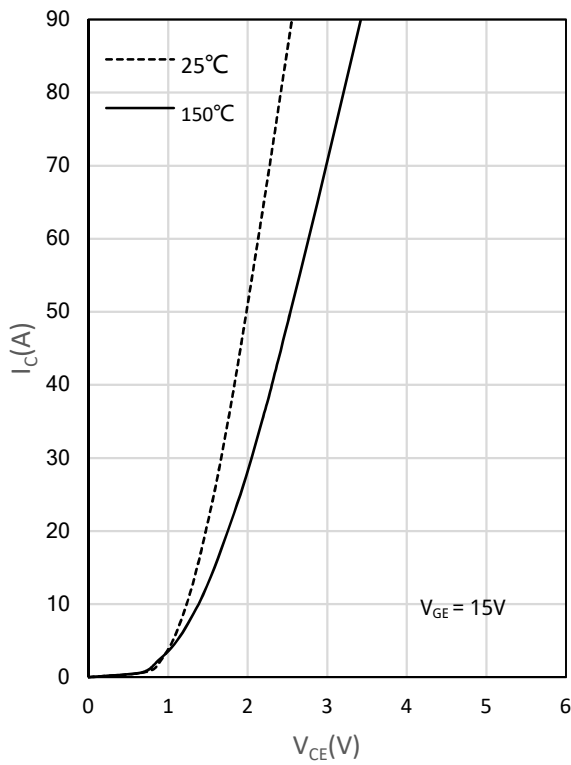


Fig. 4 Gate charge characteristics

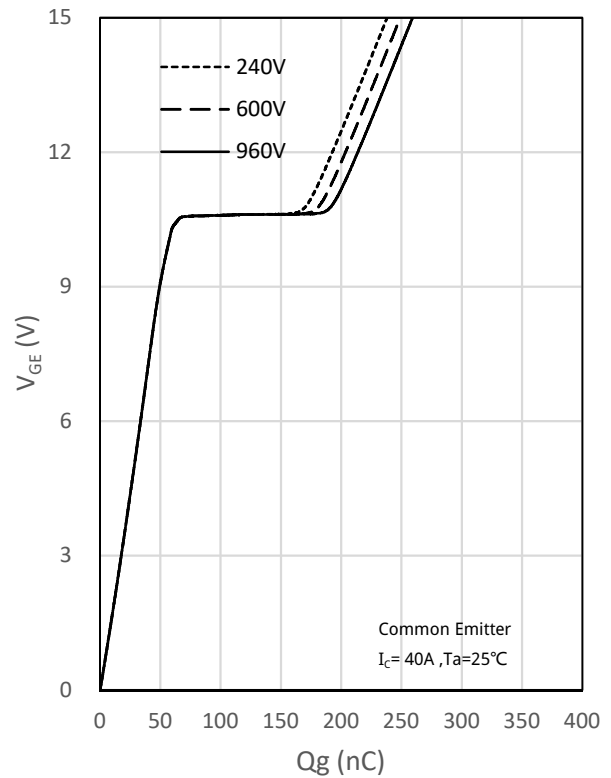


Fig. 5 Switching times vs. gate resistor

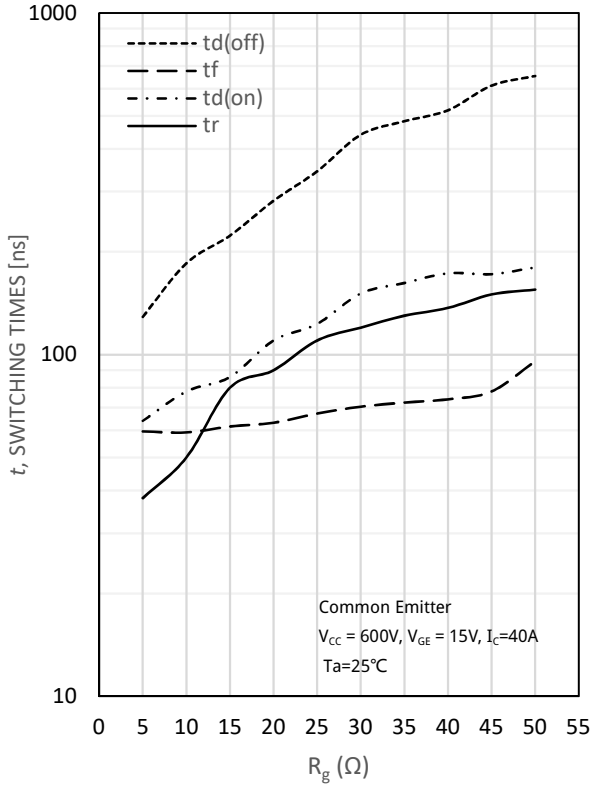


Fig. 6 Switching times vs. collector current

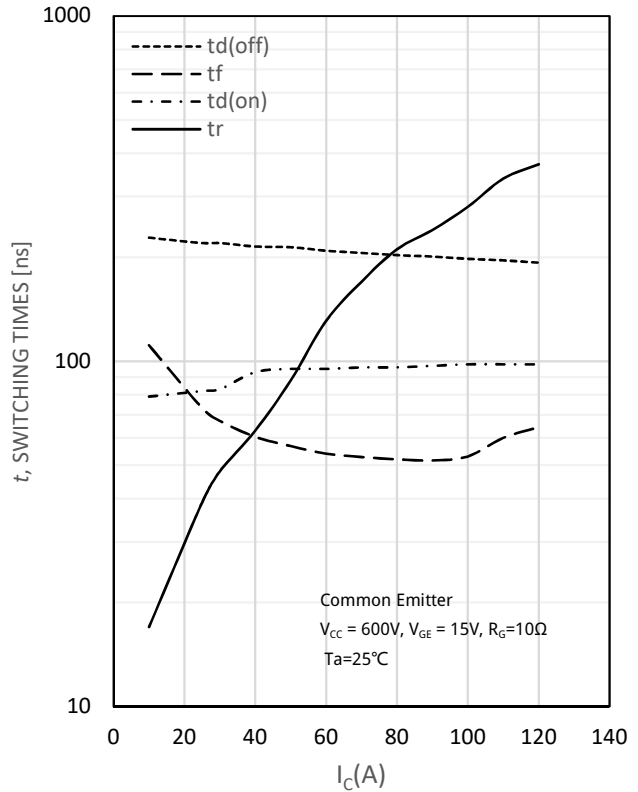


Fig. 7 Switching loss vs. gate resistor

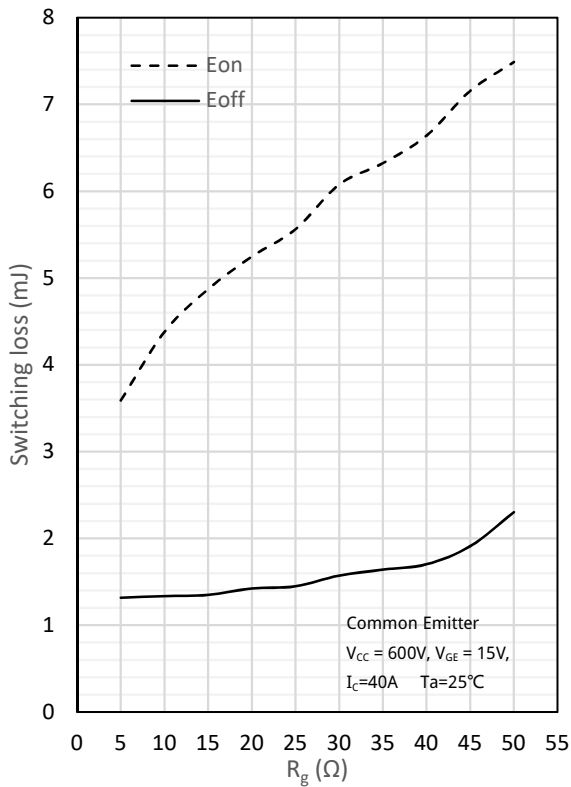


Fig. 8 Switching loss vs. collector current

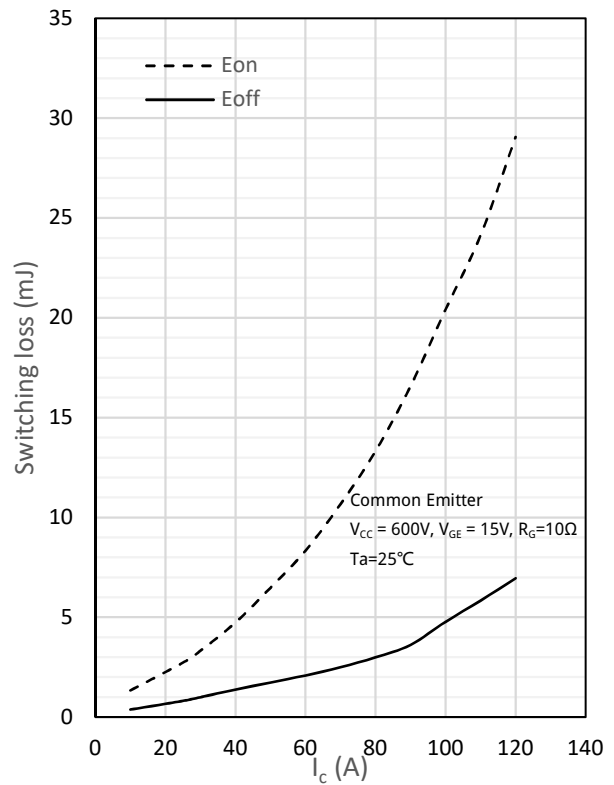
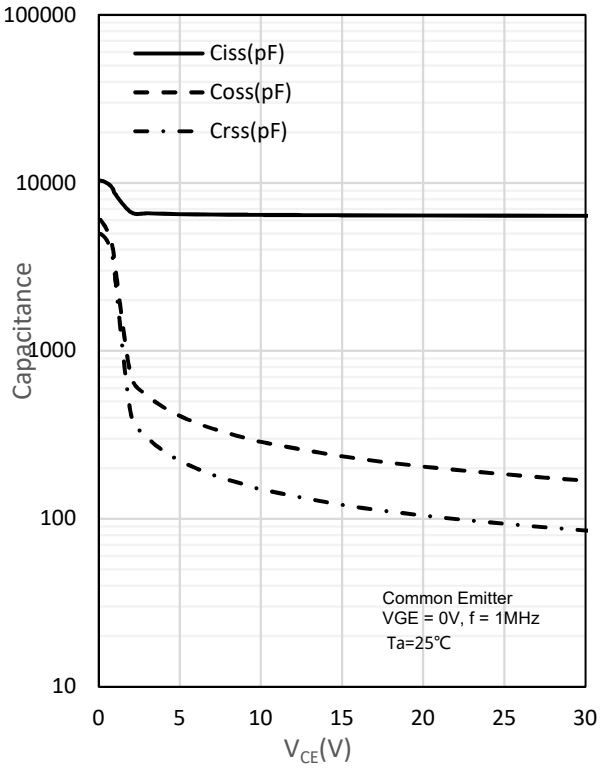
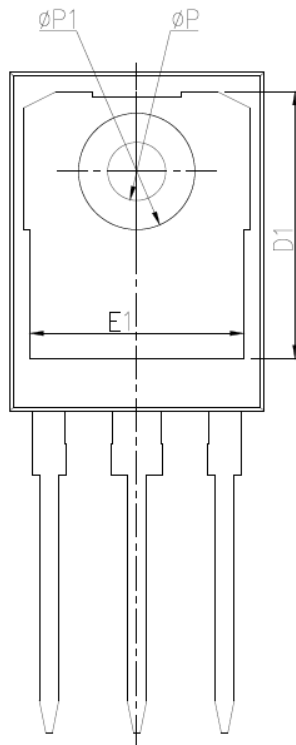
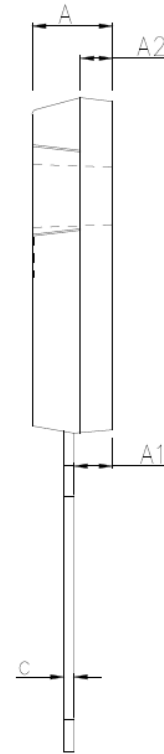
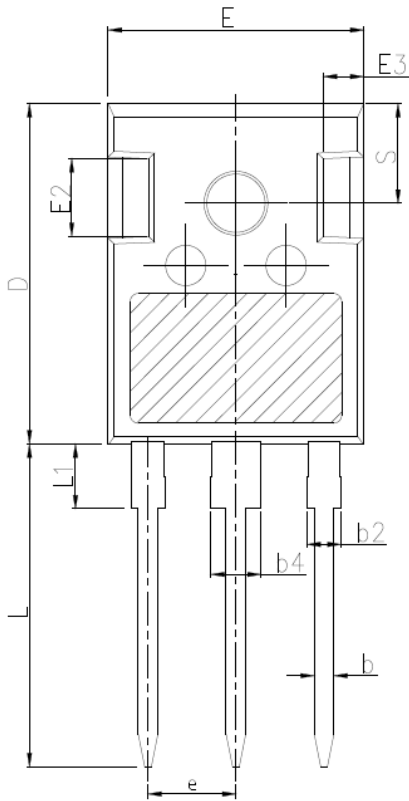


Fig. 9 Capacitance characteristics



**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
$\Phi P$	3.40	3.60	3.80
$\Phi P1$	-	-	7.30
S	6.15BSC		