

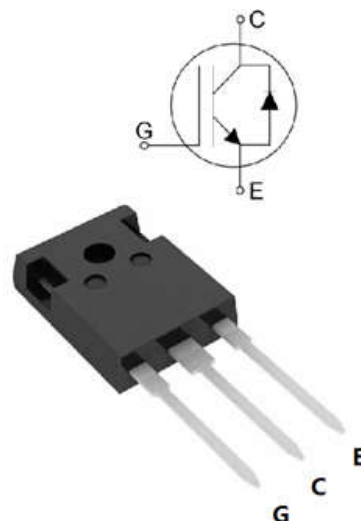
FEATURES

- 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

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

APPLICATION

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



Product	Package	Packaging
YGW60N65F1A2	TO247	Tube

Maximum Ratings ($T_j = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC collector current, limited by T_{jmax} $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_C	120 60	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}	± 20	V
Transient Gate-emitter voltage	V_{GE}	± 30	V
Turn off safe operating area $V_{CE} \leq 650\text{V}$, $T_j \leq 175^\circ\text{C}$	-	180	A
Pulse collector current, $V_{GE} = 15\text{V}$, t_p limited by T_{jmax}	I_{CM}	180	A
Power dissipation, $T_j = 25^\circ\text{C}$	P_{tot}	312	W
Operating junction temperature	T_j	$-40 \dots +175$	$^\circ\text{C}$
Storage temperature	T_S	$-55 \dots +175$	$^\circ\text{C}$
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s	-	260	$^\circ\text{C}$
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°C 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 $T_j=25^{\circ}\text{C}$						
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 400\text{V}, I_C = 60.0\text{A},$ $V_{GE} = 0.0/15.0\text{V},$ $R_g = 12\Omega$	-	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 ($T_j = 25^{\circ}\text{C}$ unless otherwise specified)

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

Fig. 1 FBSOA characteristics

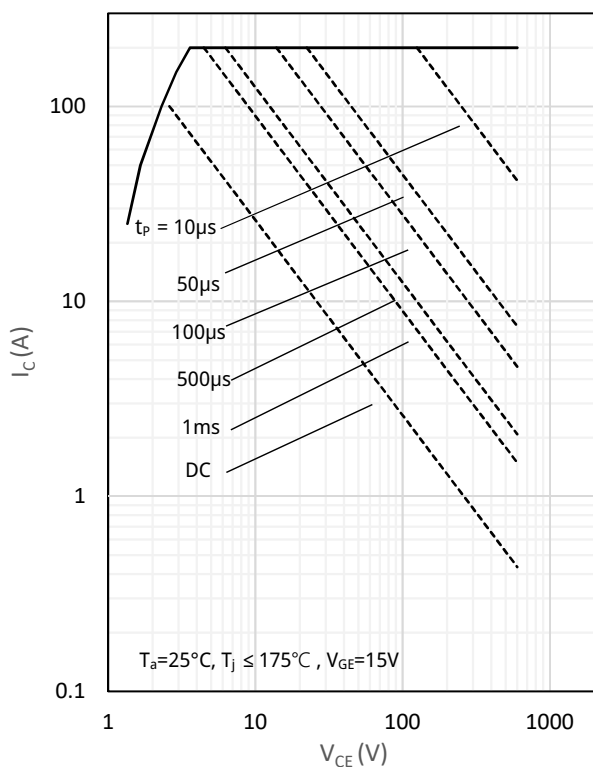


Fig. 2 Power dissipation as a function of T_C

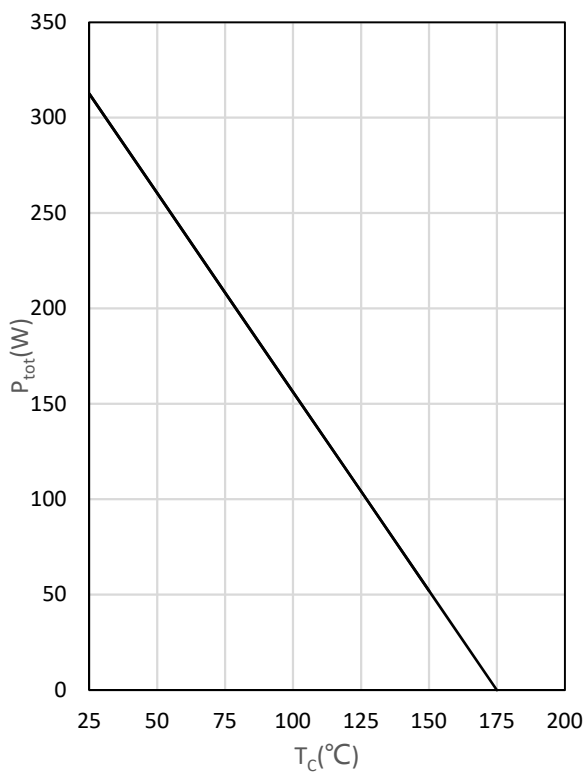


Fig. 3 Output characteristics

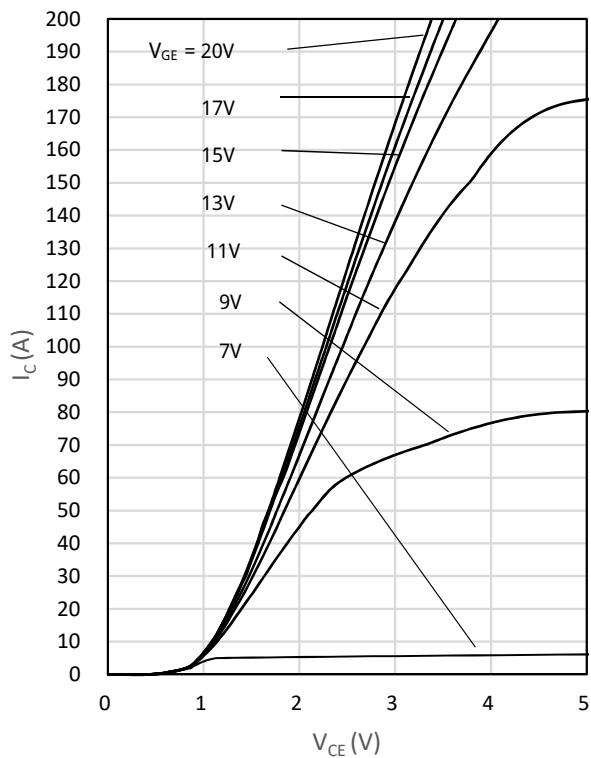


Fig. 4 Saturation voltage characteristics

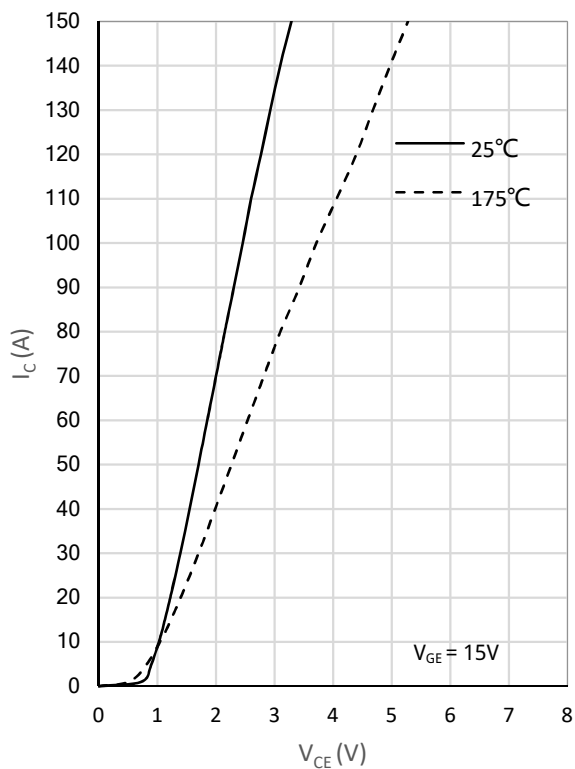


Fig. 5 Switching times vs. gate resistor

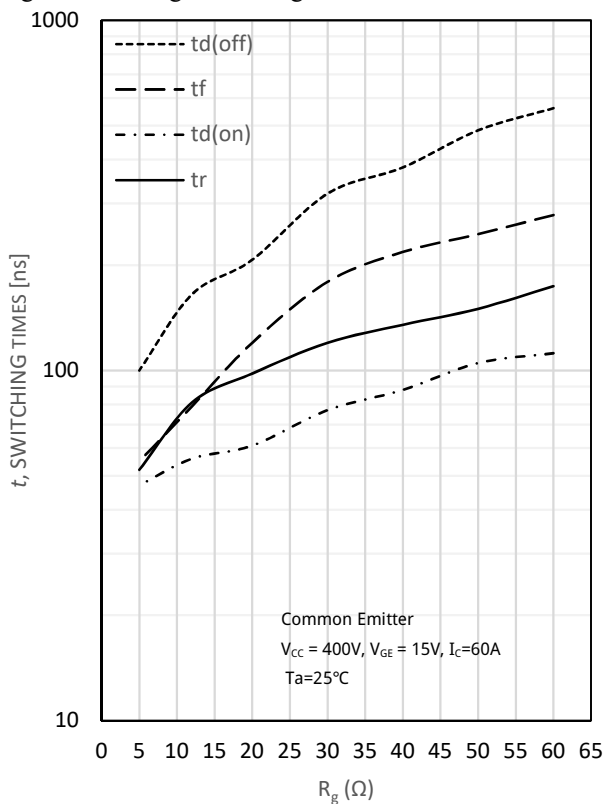


Fig. 6 Switching times vs. collector current

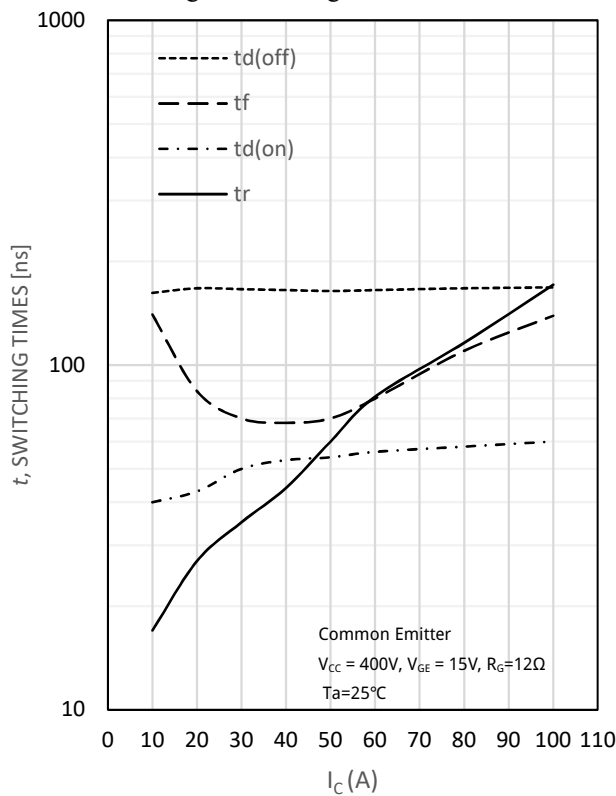


Fig. 7 Switching loss vs. gate resistor

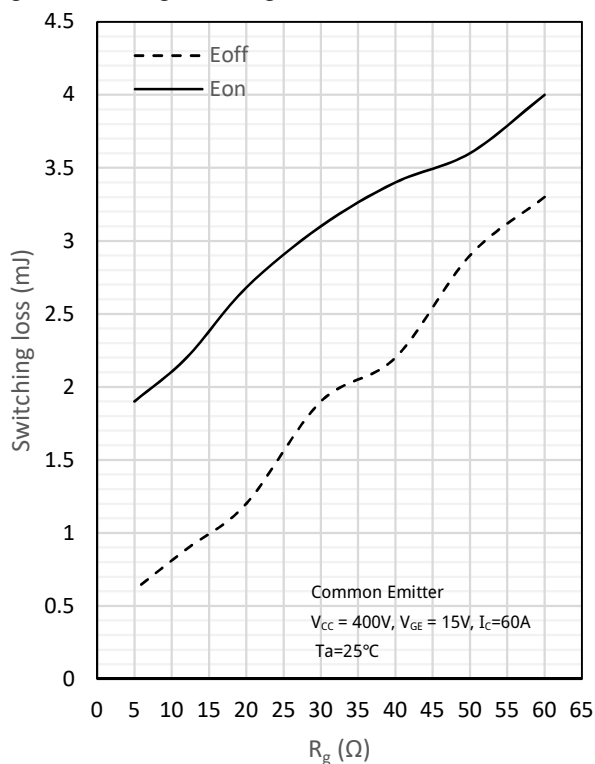


Fig. 8 Switching loss vs. collector current

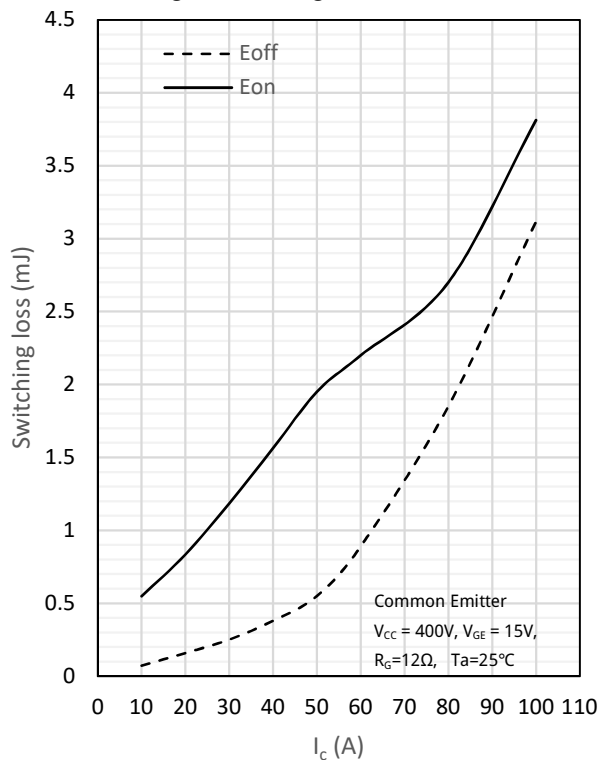


Fig. 9 Gate charge characteristics

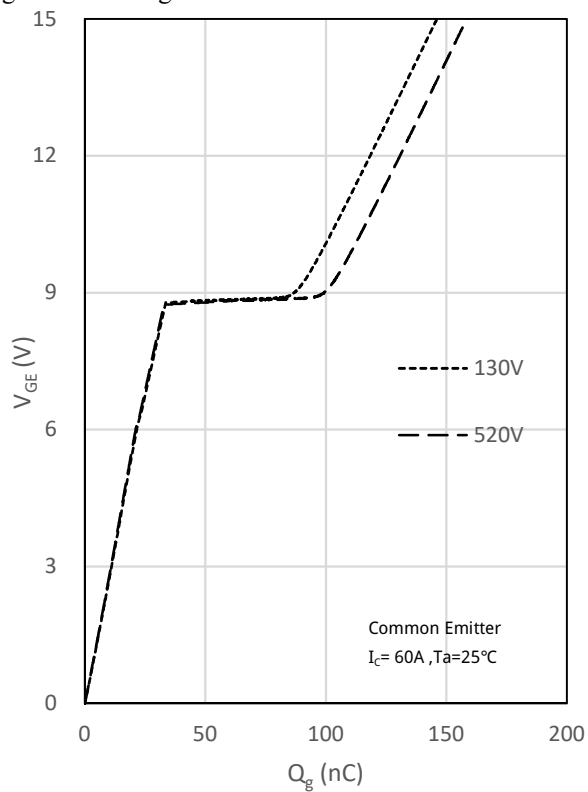
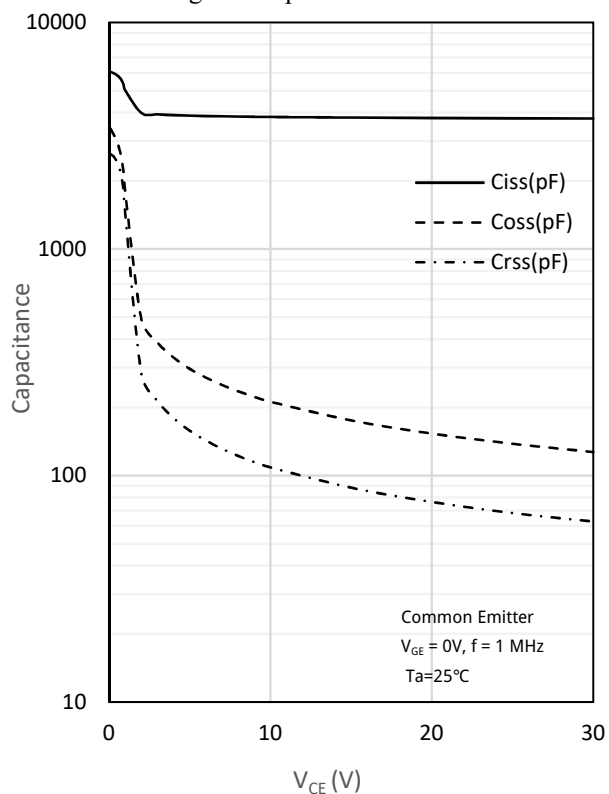
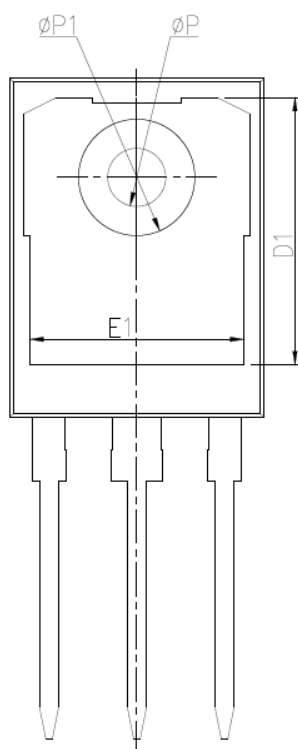
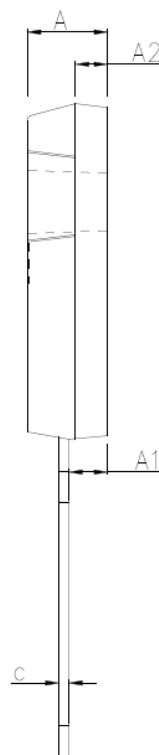
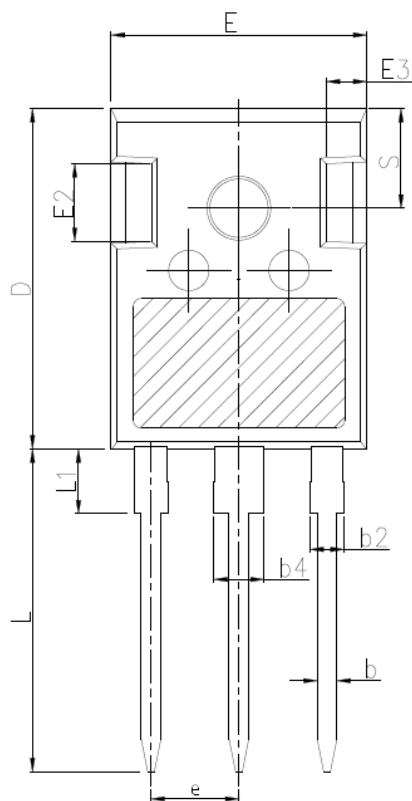


Fig. 10 Capacitance characteristics



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		