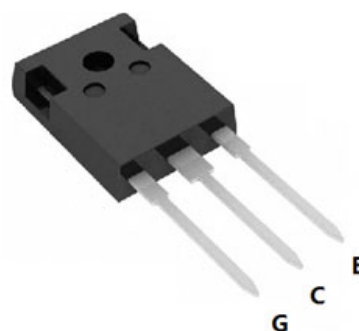
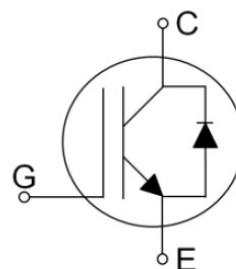


FEATURES

- High breakdown voltage to 1200V 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}	1200	V
I_C	50	A
$V_{CE(sat)}$ $I_C=50A$	1.85	V



APPLICATION

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

Product	Package	Packaging
YGW50N120FSA1	TO247	Tube

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	1200	V
DC collector current, limited by T_{jmax} $T_C = 25^{\circ}C$ $T_C = 100^{\circ}C$	I_C	100 50	A
Diode Forward current, limited by T_{jmax} $T_C = 25^{\circ}C$ $T_C = 100^{\circ}C$	I_F	100 50	A
Continuous Gate-emitter voltage	V_{GE}	± 20	V
Transient Gate-emitter voltage ($t_p \leq 10\mu s$, $D < 0.01$)	V_{GE}	± 30	V
Turn off safe operating area $V_{CE} \leq 1200V$, $T_j \leq 150^{\circ}C$	-	150	A
Pulsed Collector Current, $V_{GE} = 15V$, t_p limited by T_{jmax}	I_{CM}	150	A
Diode Pulsed Current, t_p limited by T_{jmax}	I_{Fpuls}	150	A
Power dissipation, $T_j = 25^{\circ}C$	P_{tot}	350	W
Max. Junction Temperature	T_{jmax}	175	$^{\circ}C$
Operating junction temperature	$T_{j,op}$	-40...+150	$^{\circ}C$
Storage temperature	T_s	-55...+150	$^{\circ}C$
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s	-	260	$^{\circ}C$
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	$R_{\theta(j-c)}$	0.36	K/W
Diode thermal resistance, junction - case	$R_{\theta(j-c)}$	0.7	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
Static						
Collector-Emitter breakdown voltage	$BV_{CE}^{①}$	$V_{GE}=0V, I_C=250\mu A$	1200	-	-	V
Gate threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	5.3	6.0	V
Collector-Emitter Saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=50A$ $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	- -	1.85 2.18	2.25 -	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	μA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA
Transconductance	g_{fs}	$V_{CE}=20V, I_C=50A$	-	42	-	S

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input capacitance	C_{ies}	$V_{CE} = 30V, V_{GE} = 0V,$ $f = 1MHz$	-	4840	-	pF
Output capacitance	C_{oes}		-	208	-	
Reverse transfer capacitance	C_{res}		-	25	-	
Gate charge	Q_G	$V_{CC} = 900V, I_C = 50A,$ $V_{GE} = 15V$	-	133	-	nC
Short circuit collector current	$I_{C(SC)}$	$V_{GE}=15V, t_{sc}\leq 5us$ $V_{CC}=600V,$ $T_{j, start}=25^\circ\text{C}$	-	480	-	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
Dynamic						
Turn-on delay time	$t_{d(on)}$	$T_j=25^{\circ}\text{C}$, $V_{CC} = 600\text{V}$, $I_C = 50\text{A}$, $V_{GE} = 0/15\text{V}$, $R_g=10\Omega$	-	49	-	ns
Rise time	t_r		-	45	-	ns
Turn-on energy	E_{on}		-	2.9	-	mJ
Turn-off delay time	$t_{d(off)}$		-	178	-	ns
Fall time	t_f		-	84	-	ns
Turn-off energy	E_{off}		-	1.7	-	mJ
Turn-on delay time	$t_{d(on)}$	$T_j=150^{\circ}\text{C}$, $V_{CC} = 600\text{V}$, $I_C = 50\text{A}$, $V_{GE} = 0/15\text{V}$, $R_g=10\Omega$	-	52	-	ns
Rise time	t_r		-	58	-	ns
Turn-on energy	E_{on}		-	3.4	-	mJ
Turn-off delay time	$t_{d(off)}$		-	217	-	ns
Fall time	t_f		-	143	-	ns
Turn-off energy	E_{off}		-	2.8	-	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}	$I_F = 50\text{A}$, $T_j=25^{\circ}\text{C}$	-	3.0	-	V
Reverse Recovery Time	T_{rr}	$T_j=25^{\circ}\text{C}$ $I_F=50\text{A}$, $V_R = 600\text{V}$, $di/dt=750\text{A}/\mu\text{s}$,	-	250	-	ns
Reverse Recovery Current	I_{rr}		-	20	-	A
Reverse Recovery Charge	Q_{rr}		-	600	-	nC

Fig. 1 FBSOA characteristics

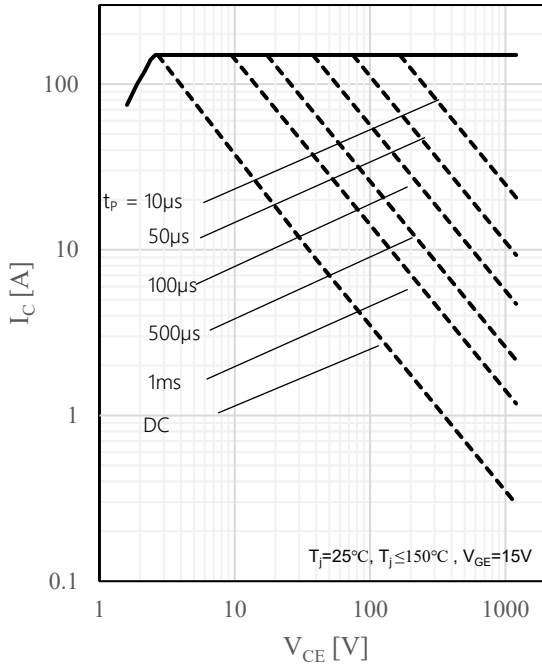


Fig. 2 Output characteristics

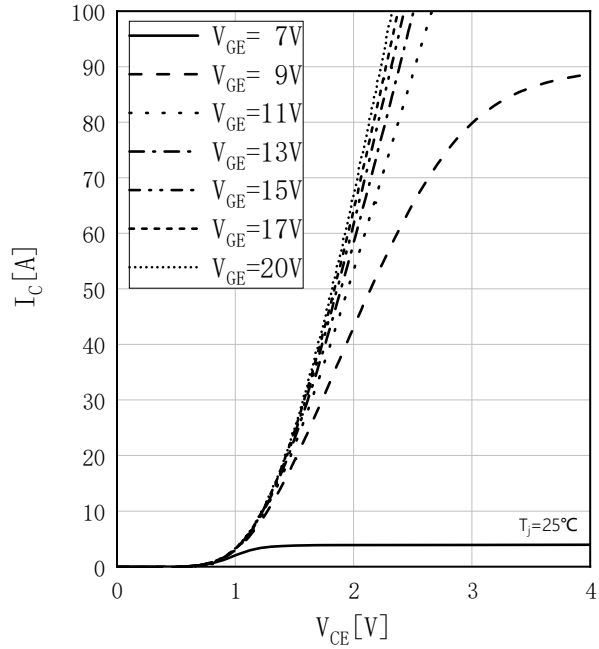


Fig. 3 Saturation voltage characteristics

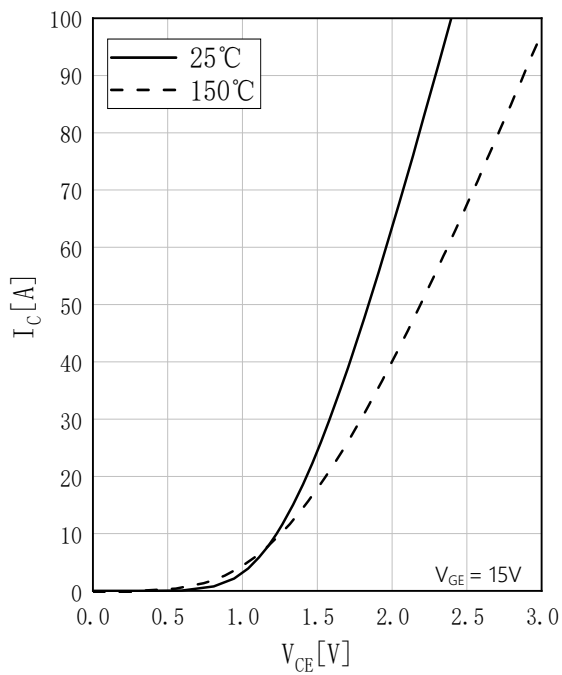


Fig. 4 Typical transfer characteristic

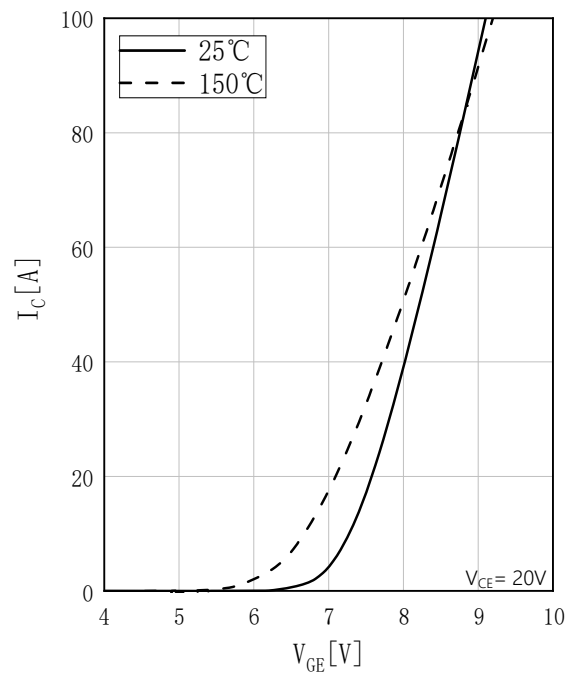


Fig. 5 Switching times vs. gate resistor

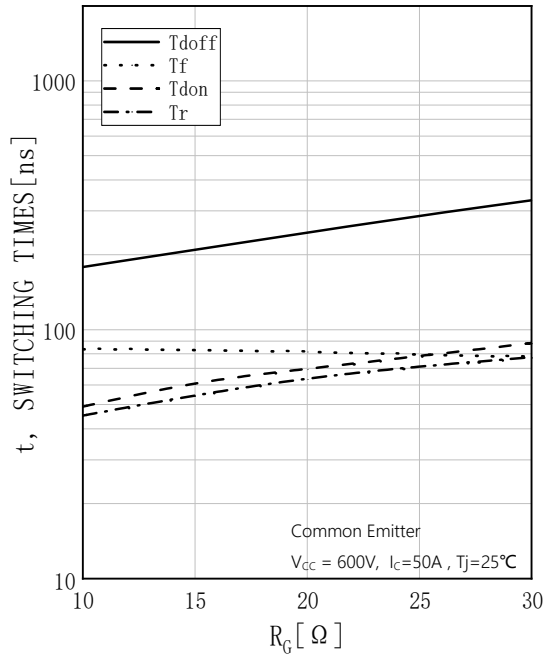


Fig. 6 Switching times vs. collector current

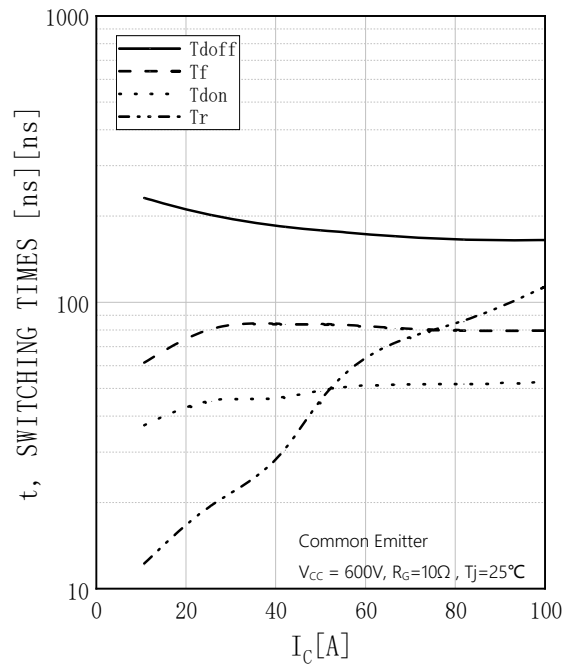


Fig. 7 Switching loss vs. gate resistor

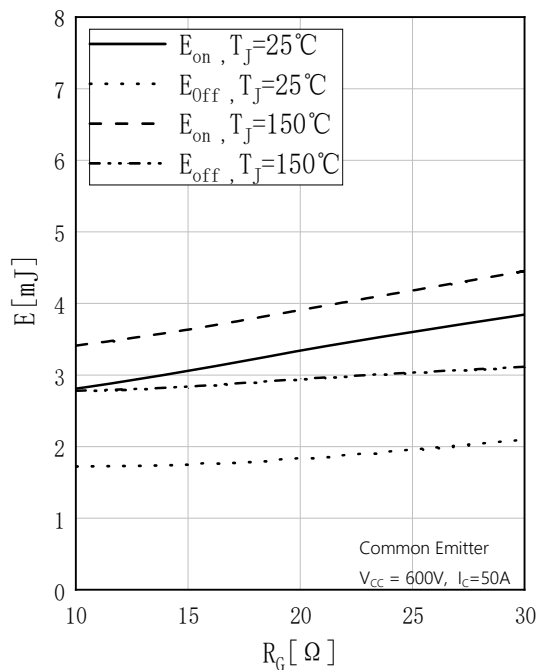


Fig. 8 Switching loss vs. collector current

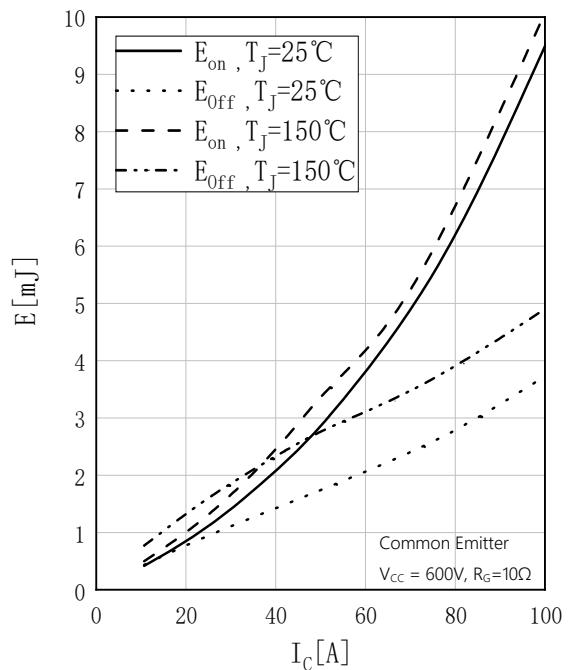


Fig.9 Diode forward current as a function of V_F

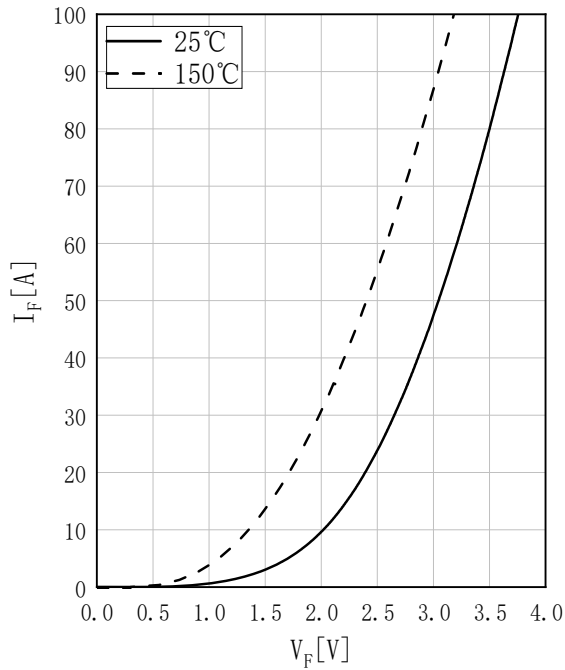


Fig. 10 Typical reverse energy loss vs. forward current

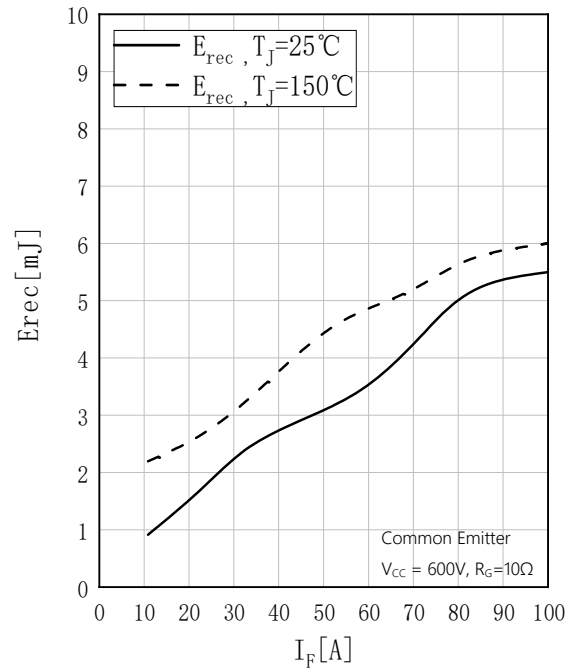


Fig. 11 IGBT Transient Thermal Impedance

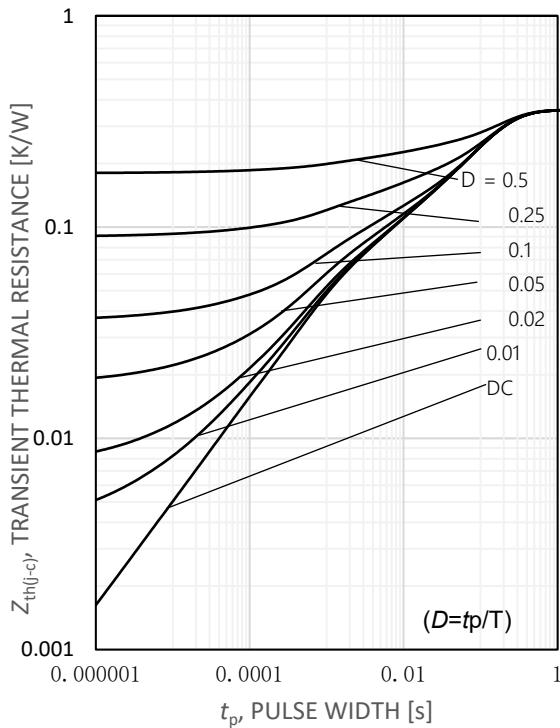


Fig. 12 FRD Transient Thermal Impedance

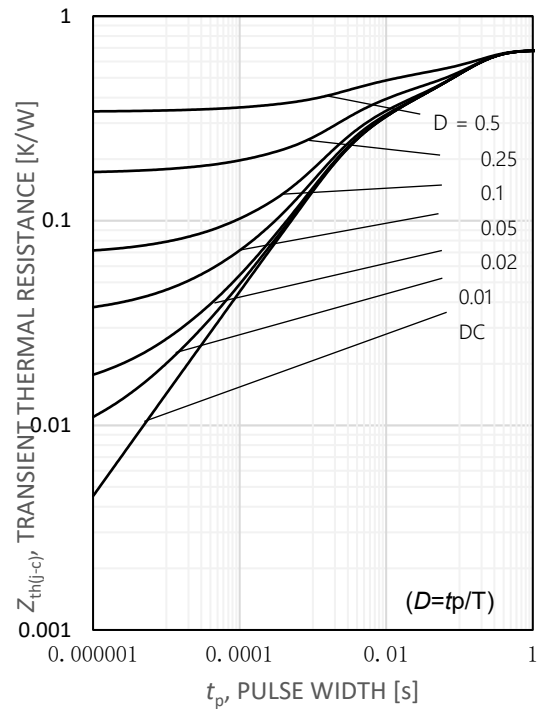


Fig.13 Gate charge characteristics

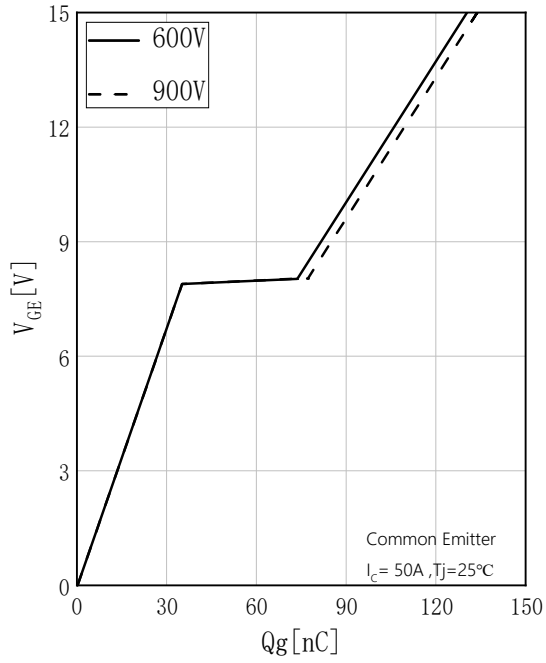
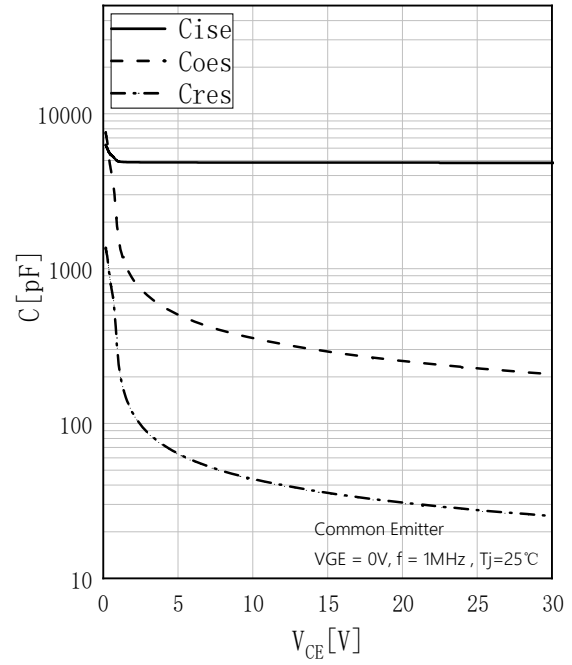
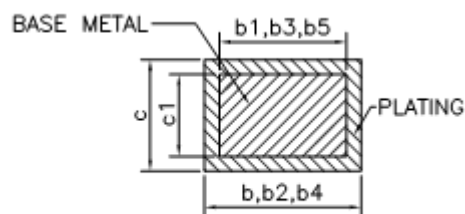
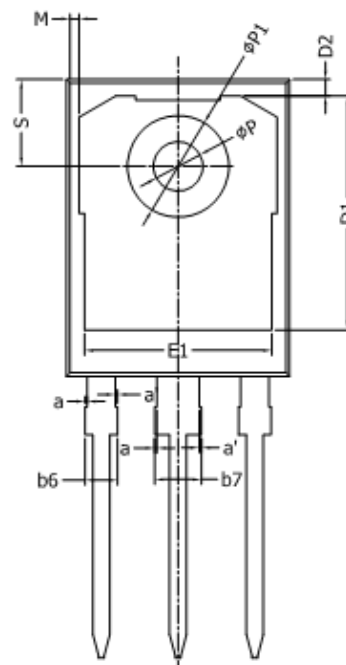
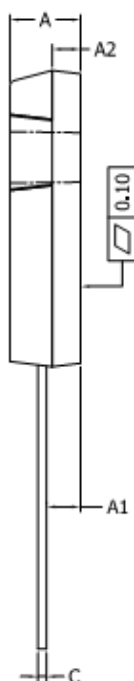
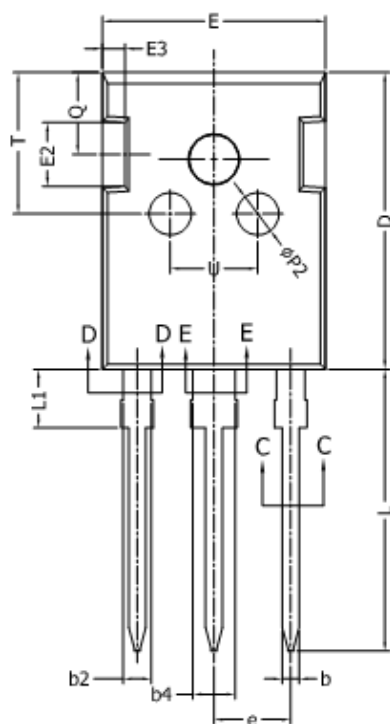


Fig. 8 Capacitance characteristics



TO247 package information



SECTION C-C, D-D & E-E

COMMON DIMENSIONS
(UNITS OF MEASURE = MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
a	0	---	0.15
a'	0	---	0.15
b	1.16	---	1.26
b1	1.15	1.2	1.22
b2	1.96	---	2.06
b3	1.95	2.00	2.02
b4	2.96	---	3.06
b5	2.96	3.00	3.02
b6	2.00	---	2.25
b7	3.00	---	3.25
c	0.59	---	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.40	4.50	4.60
E3	1.50	1.60	1.70
e	5.336	5.436	5.53
L	19.80	19.92	20.10
L1	4.10	---	4.30
M	0.35	---	0.95
P	3.40	3.50	3.60
P1	7.00	---	7.40
P2	2.40	2.50	2.60
Q	5.60	---	6.00
S	6.05	6.15	6.25
T	9.80	---	10.20
U	6.00	---	6.40