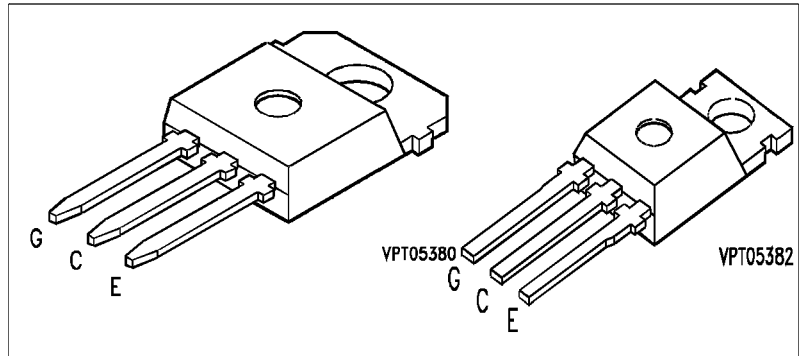


IGBT Transistors

BUP 202
BUP 302

- N channel
- MOS input (voltage-controlled)
- Low forward voltage drop
- High switching speed
- Very low tail current
- Low temperature sensitivity
- Avalanche-rated
- Latch-up-free
- Suitable free wheeling diode on request



Type	V_{CE}	I_C	Package ¹⁾	Ordering Code
BUP 202	1000 V	12 A	TO-220 AB	C67078-A4401-A2
BUP 302	1000 V	12 A	TO-218 AA	C67078-A4205-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous collector current, $T_C = 25\text{ °C}$ $T_C = 90\text{ °C}$	I_C	12 8	A
Pulsed collector current, $T_C = 90\text{ °C}$	$I_{C\text{ puls}}$	16	
Repetitive avalanche current, $T_{j\text{ max}} = 150\text{ °C}$	I_{AR}	1.6	
Avalanche energy, single pulse $I_C = 5\text{ A}$, $V_{CC} = 24\text{ V}$, $R_{GE} = 25\text{ }\Omega$	E_{AS}	10	mJ
Collector-emitter voltage	V_{CE}	1000	V
Gate-emitter voltage	V_{GE}	± 20	
Power dissipation, $T_C = 25\text{ °C}$	P_{tot}	100	W
Operating and storage temperature range	T_j, T_{stg}	- 55 ... + 150	°C
Thermal resistance	$R_{th\text{ JC}}$	≤ 1.25	K/W
DIN humidity category, DIN 40 040	–	E	–
IEC climatic category, DIN IEC 68-1	–	55/150/56	

IGBT = Insulated Gate **B**ipolar **T**ransistor

1) See chapter Package Outlines.

Electrical Characteristics

at $T_j = 25\text{ °C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Static characteristics

Collector-emitter breakdown voltage $V_{GE} = 0\text{ V}, I_C = 0.1\text{ mA}$	$V_{(BR)CES}$	1000	–	–	V
Gate threshold voltage $V_{GE} = V_{CE}, I_C = 0.3\text{ mA}$	$V_{GE(th)}$	4.5	5.5	6.5	
Zero gate voltage collector current $V_{CE} = 1000\text{ V}, V_{GE} = 0\text{ V}$ $T_j = 25\text{ °C}$ $T_j = 125\text{ °C}$	I_{CES}	– –	1 –	100 300	μA
Gate-emitter leakage current $V_{GE} = 20\text{ V}, V_{CE} = 0\text{ V}$	I_{GES}	–	0.1	100	nA
Collector-emitter saturation voltage $V_{GE} = 15\text{ V}, I_C = 5\text{ A}$ $T_j = 25\text{ °C}$ $T_j = 125\text{ °C}$ $T_j = 150\text{ °C}$	$V_{CE(sat)}$	– – –	2.8 3.8 4.0	3.3 4.3 4.5	V

Dynamic characteristics

Forward transconductance $V_{CE} = 20\text{ V}, I_C = 5\text{ A}$	g_{fs}	1.7	2.5	–	S
Input capacitance $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$	C_{iss}	–	650	–	pF
Output capacitance $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$	C_{oss}	–	50	–	
Reverse transfer capacitance $V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$	C_{rss}	–	20	–	

Switching Characteristics

at $T_j = 25\text{ °C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Resistive load

Turn-on delay time $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 5\text{ A}$ $R_{g(on)} = 3.3\ \Omega$, $R_{g(off)} = 3.3\ \Omega$, $T_j = 125\text{ °C}$	$t_{d(on)}$	–	15	–	ns
Rise time $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 5\text{ A}$ $R_{g(on)} = 3.3\ \Omega$, $R_{g(off)} = 3.3\ \Omega$, $T_j = 125\text{ °C}$	t_r	–	100	–	
Turn-off delay time $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 5\text{ A}$ $R_{g(on)} = 3.3\ \Omega$, $R_{g(off)} = 3.3\ \Omega$, $T_j = 125\text{ °C}$	$t_{d(off)}$	–	120	–	
Fall time $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 5\text{ A}$ $R_{g(on)} = 3.3\ \Omega$, $R_{g(off)} = 3.3\ \Omega$, $T_j = 125\text{ °C}$	t_f	–	150	–	

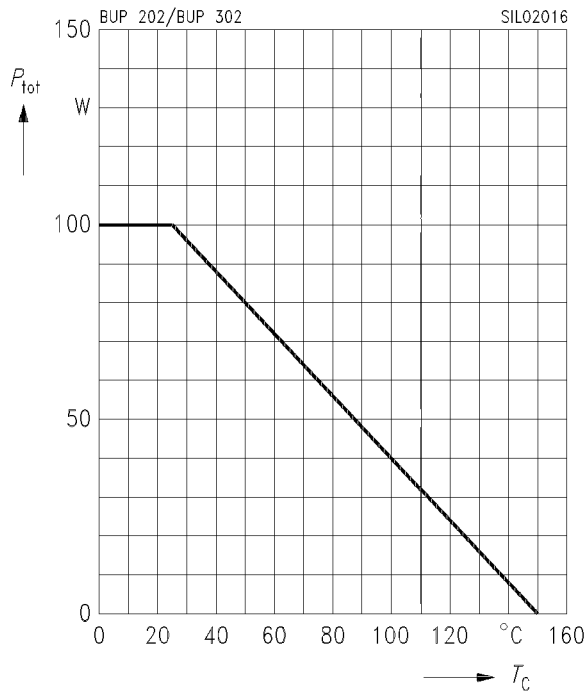
Inductive load

Turn-off delay time $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 5\text{ A}$ $R_{g(on)} = 3.3\ \Omega$, $R_{g(off)} = 3.3\ \Omega$, $T_j = 125\text{ °C}$	$t_{d(off)}$	90	120	150	ns
Fall time $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 5\text{ A}$ $R_{g(on)} = 3.3\ \Omega$, $R_{g(off)} = 3.3\ \Omega$, $T_j = 125\text{ °C}$	t_f	10	15	20	
Turn-off loss ($E_{off} = E_{off1} + E_{off2}$) $V_{CC} = 600\text{ V}$, $V_{GE} = 15\text{ V}$, $I_C = 5\text{ A}$ $R_{g(on)} = 3.3\ \Omega$, $R_{g(off)} = 3.3\ \Omega$, $T_j = 125\text{ °C}$	E_{off1} E_{off2}	– –	0.25 0.35	–	mWs

Characteristics at $T_j = 25^\circ\text{C}$, unless otherwise specified.

Power dissipation

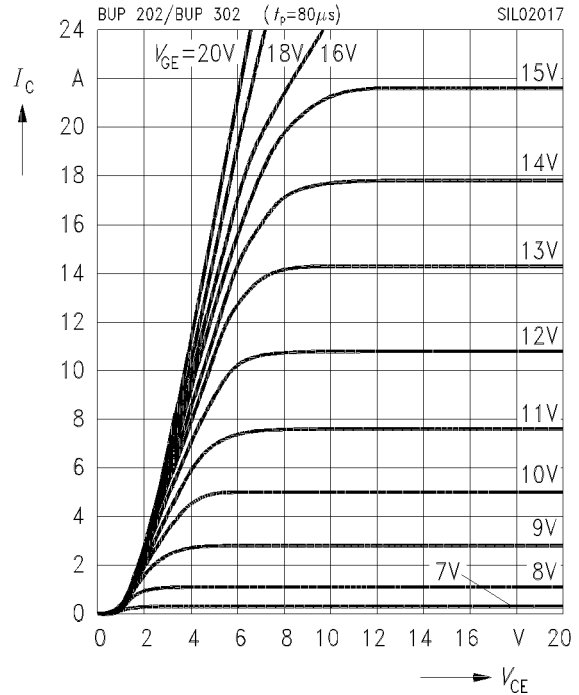
$P_{\text{tot}} = f(T_C)$



Typ. output characteristics

$I_C = f(V_{CE})$

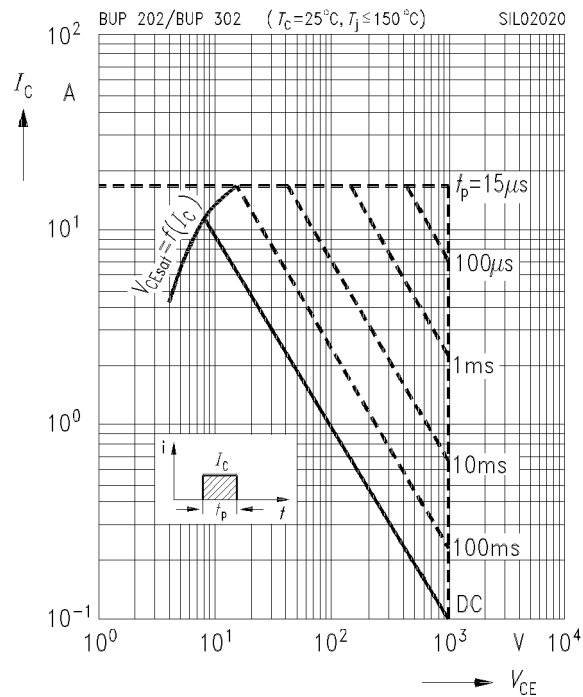
parameter: $t_p = 80 \mu\text{s}$



Safe operating area

$I_C = f(V_{CE})$

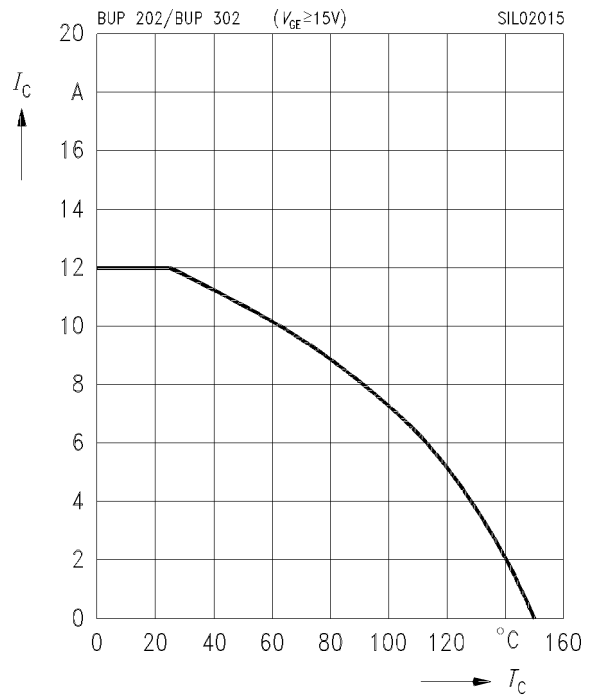
parameter: $T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$



Collector current

$I_C = f(T_C)$

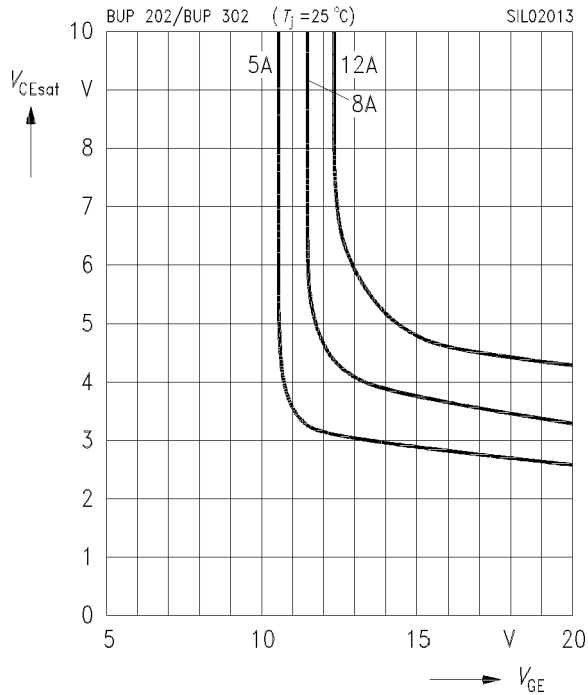
parameter: $V_{GE} \geq 15\text{V}$; $T_j \leq 150^\circ\text{C}$



Typ. saturation characteristics

$$V_{CE(sat)} = f(V_{GE})$$

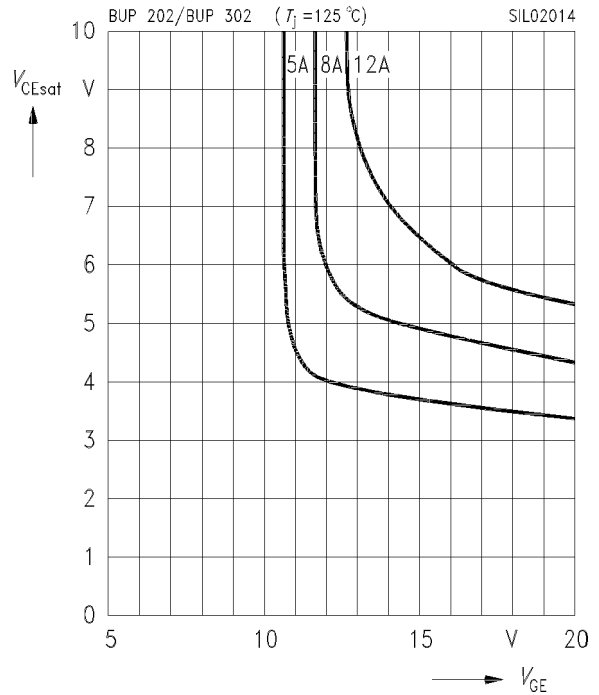
parameter: $T_j = 25\text{ }^\circ\text{C}$



Typ. saturation characteristics

$$V_{CE(sat)} = f(V_{GE})$$

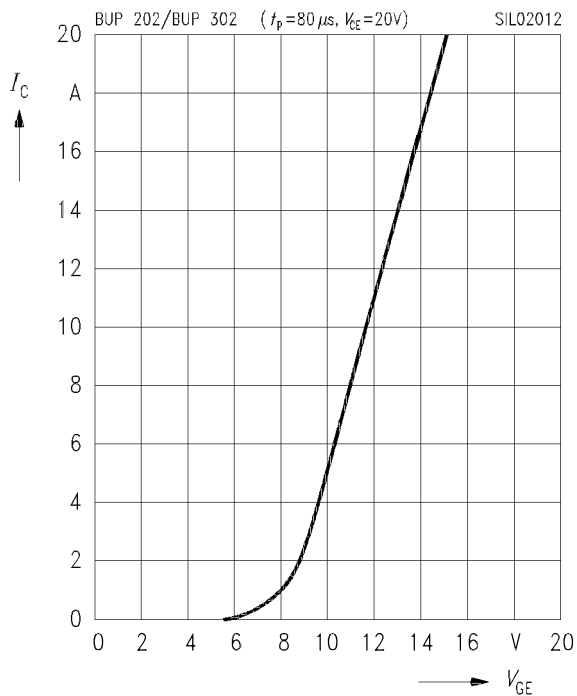
parameter: $T_j = 125\text{ }^\circ\text{C}$



Typ. transfer characteristics

$$I_C = f(V_{GE})$$

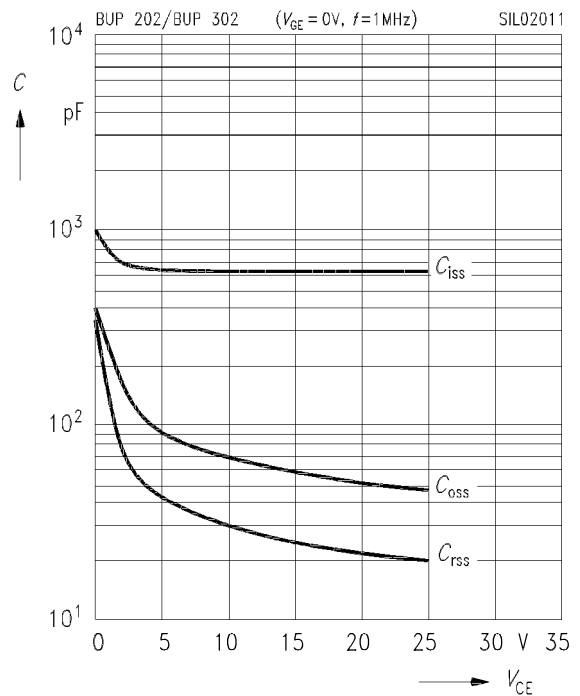
parameter: $t_p = 80\text{ }\mu\text{s}$, $V_{CE} = 20\text{ V}$



Typ. capacitances

$$C = f(V_{CE})$$

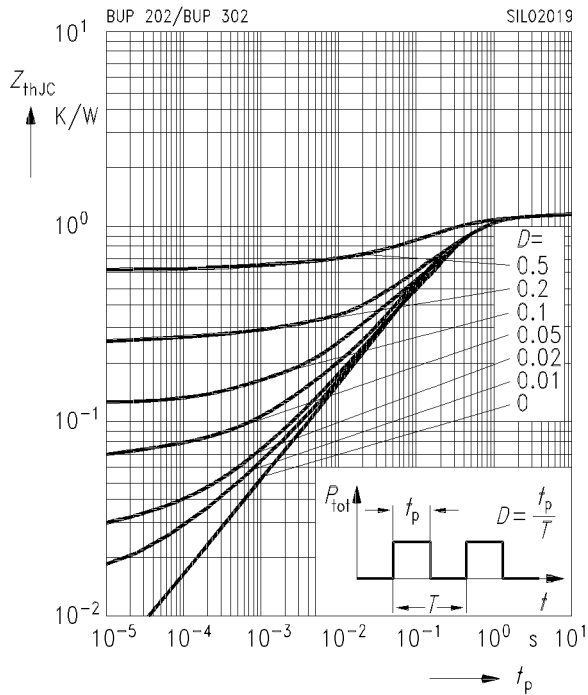
parameter: $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$



Transient thermal impedance

$$Z_{thJC} = f(t_p)$$

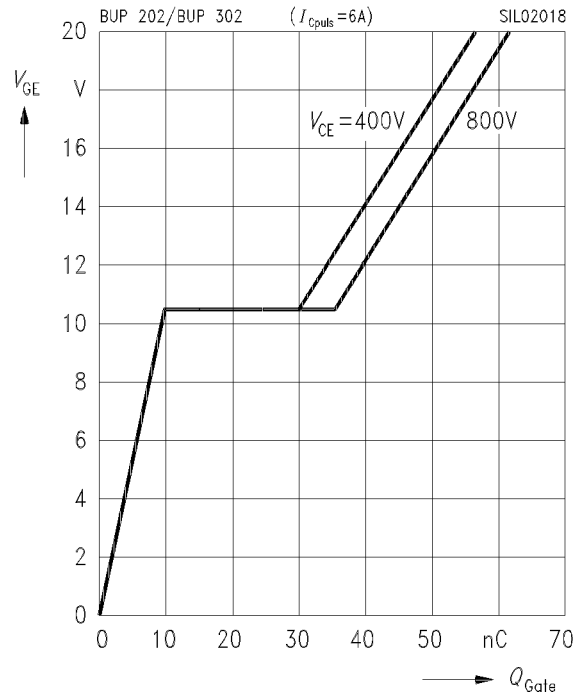
parameter: $D = t_p / T$



Typ. gate charge

$$V_{GE} = f(Q_{Gate})$$

parameter: $I_{C\ puls} = 6\ A$



Typ. switching time $t = f(R_G)$ Inductive load

parameter: $T_j = 125\ ^\circ\text{C}$, $V_{CE} = 600\ \text{V}$,

$V_{GE} = \pm 15\ \text{V}$, $I_C = 5\ \text{A}$

