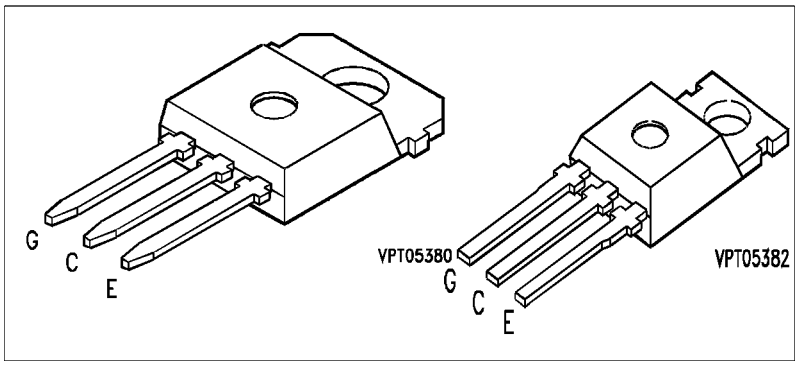
SIEMENS

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 °C T_C = 90 °C	I_C	**12** **8**	A
Pulsed collector current, T_C = 90 °C	$I_{C\,puls}$	**16**	
Repetitive avalanche current, $T_{j\,max}$ = 150 °C	I_{AR}	**1.6**	
Avalanche energy, single pulse I_C = 5 A, V_{CC} = 24 V, R_{GE} = 25 Ω	E_{AS}	**10**	mJ
Collector-emitter voltage	V_{CE}	**1000**	V
Gate-emitter voltage	V_{GE}	± **20**	
Power dissipation, T_C = 25 °C	P_{tot}	**100**	W
Operating and storage temperature range	T_j , T_{stg}	**– 55 ... + 150**	°C

Thermal resistance	$R_{th\,JC}$	≤ **1.25**	K/W
DIN humidity category, DIN 40 040	–	**E**	–
IEC climatic category, DIN IEC 68-1	–	**55/150/56**	

IGBT = **I**nsulated **G**ate **B**ipolar **T**ransistor

1) See chapter Package Outlines.

Electrical Characteristics

at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static characteristics					
Collector-emitter breakdown voltage V_{GE} = 0 V, I_C = 0.1 mA	$V_{(BR)\ CES}$	1000	–	–	V
Gate threshold voltage V_{GE} = V_{CE} , I_C = 0.3 mA	$V_{GE\ (th)}$	4.5	5.5	6.5	
Zero gate voltage collector current V_{CE} = 1000 V, V_{GE} = 0 V T_j = 25 °C T_j = 125 °C	I_{CES}	 – –	 1 –	 100 300	µA
Gate-emitter leakage current V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	–	0.1	100	nA
Collector-emitter saturation voltage V_{GE} = 15 V, I_C = 5 A T_j = 25 °C T_j = 125 °C T_j = 150 °C	$V_{CE\ (sat)}$	 – – –	 2.8 3.8 4.0	 3.3 4.3 4.5	V
Dynamic characteristics					
Forward transconductance V_{CE} = 20 V, I_C = 5 A	g_{fs}	1.7	2.5	–	S
Input capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{iss}	–	650	–	pF
Output capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{oss}	–	50	–	
Reverse transfer capacitance V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	C_{rss}	–	20	–	

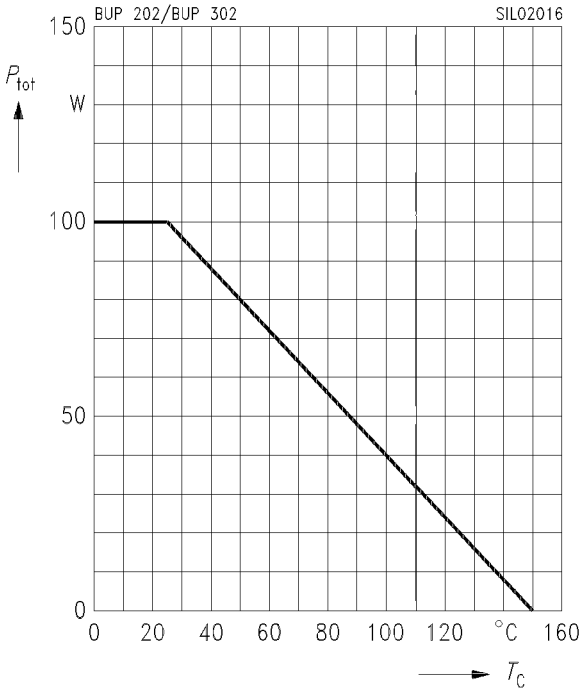
Switching Characteristics
at T_j = 25 °C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Resistive load					
Turn-on delay time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 5 A $R_{g\ (on)}$ = 3.3 Ω, $R_{g\ (off)}$ = 3.3 Ω, T_j = 125 °C	$t_{d\ (on)}$	–	15	–	ns
Rise time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 5 A $R_{g\ (on)}$ = 3.3 Ω, $R_{g\ (off)}$ = 3.3 Ω, T_j = 125 °C	t_r	–	100	–	
Turn-off delay time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 5 A $R_{g\ (on)}$ = 3.3 Ω, $R_{g\ (off)}$ = 3.3 Ω, T_j = 125 °C	$t_{d\ (off)}$	–	120	–	
Fall time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 5 A $R_{g\ (on)}$ = 3.3 Ω, $R_{g\ (off)}$ = 3.3 Ω, T_j = 125 °C	t_f	–	150	–	
Inductive load					
Turn-off delay time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 5 A $R_{g\ (on)}$ = 3.3 Ω, $R_{g\ (off)}$ = 3.3 Ω, T_j = 125 °C	$t_{d\ (off)}$	90	120	150	ns
Fall time V_{CC} = 600 V, V_{GE} = 15 V, I_C = 5 A $R_{g\ (on)}$ = 3.3 Ω, $R_{g\ (off)}$ = 3.3 Ω, T_j = 125 °C	t_f	10	15	20	
Turn-off loss (E_{off} = $E_{off\ 1}$ + $E_{off\ 2}$) V_{CC} = 600 V, V_{GE} = 15 V, I_C = 5 A $R_{g\ (on)}$ = 3.3 Ω, $R_{g\ (off)}$ = 3.3 Ω, T_j = 125 °C	$E_{off\ 1}$ $E_{off\ 2}$	– –	0.25 0.35	–	mWs

Characteristics at T_j = 25 °C, unless otherwise specified.

Power dissipation

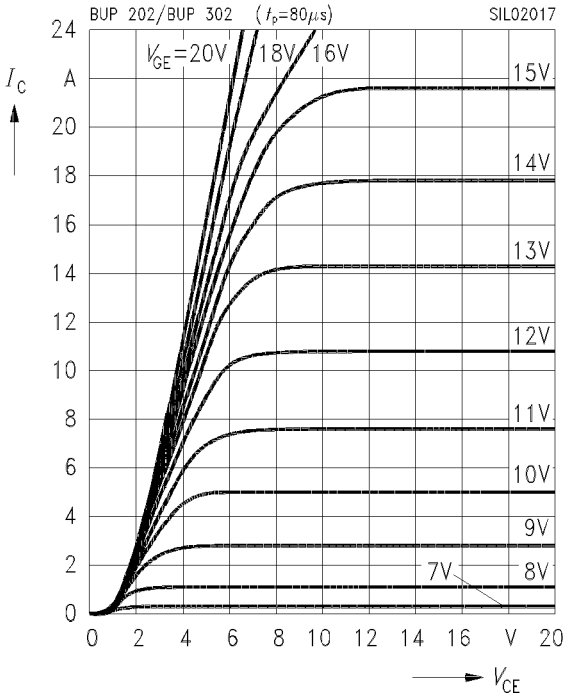
$P_{tot} = f(T_C)$



Typ. output characteristics

$I_C = f(V_{CE})$

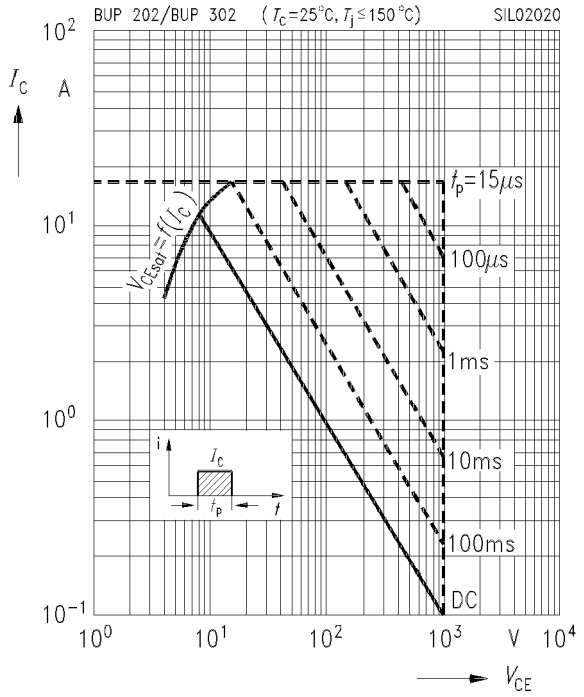
parameter: t_p = 80 µs



Safe operating area

$I_C = f(V_{CE})$

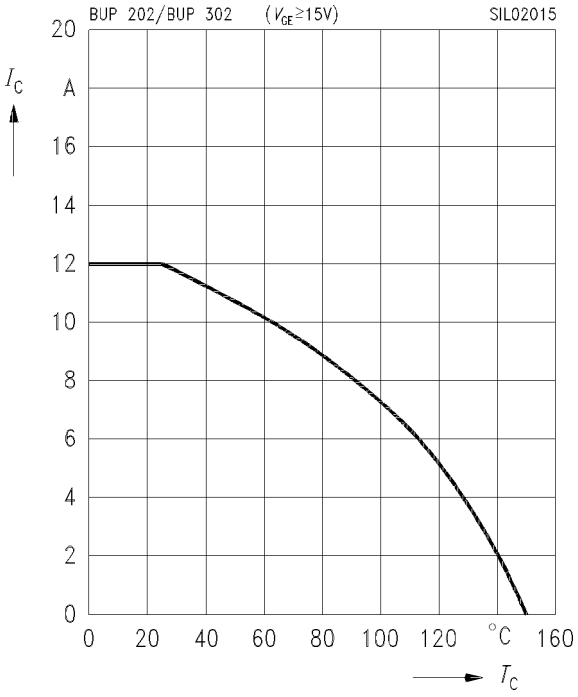
parameter: T_C = 25 °C, $T_j \leq$ 150 °C



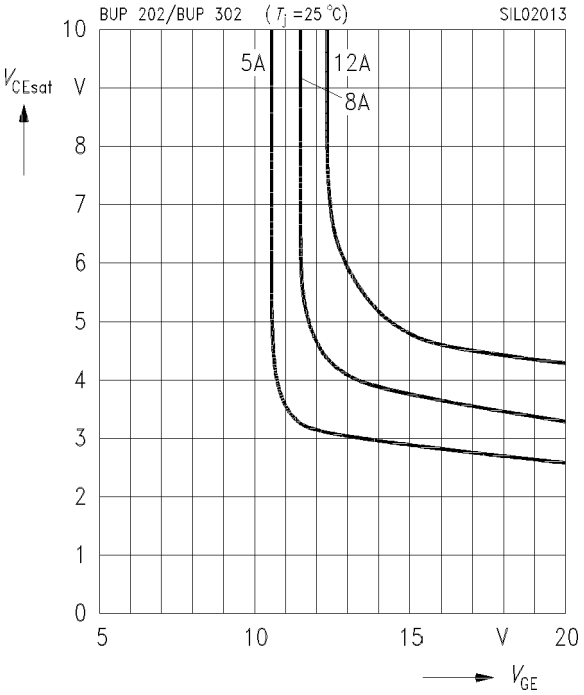
Collector current

$I_C = f(T_C)$

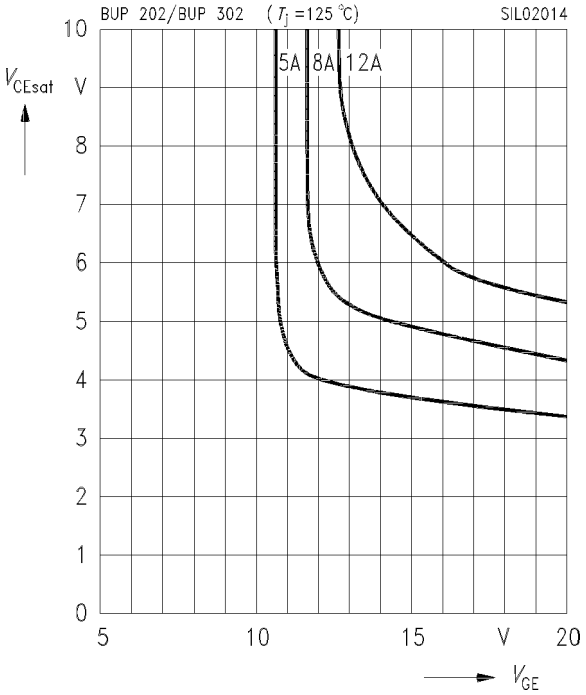
parameter: $V_{GE} \geq$ 15 V; $T_j \leq$ 150 °C



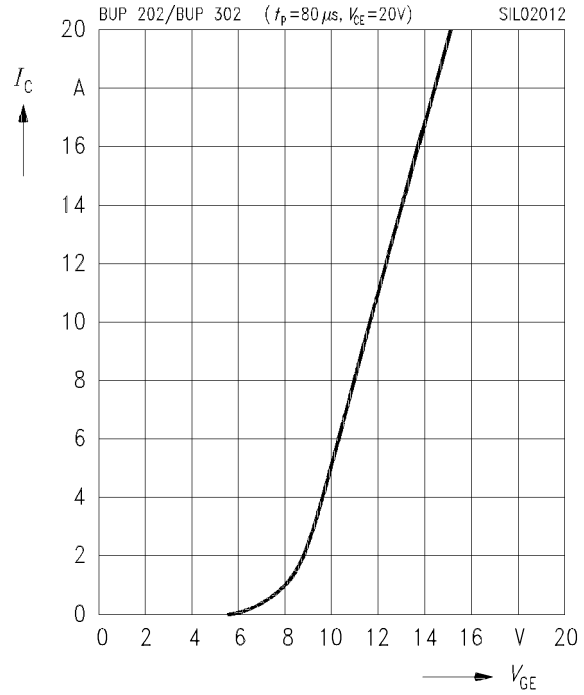
Typ. saturation characteristics
$V_{CE\,(sat)} = f(V_{GE})$
parameter: T_j = 25 °C



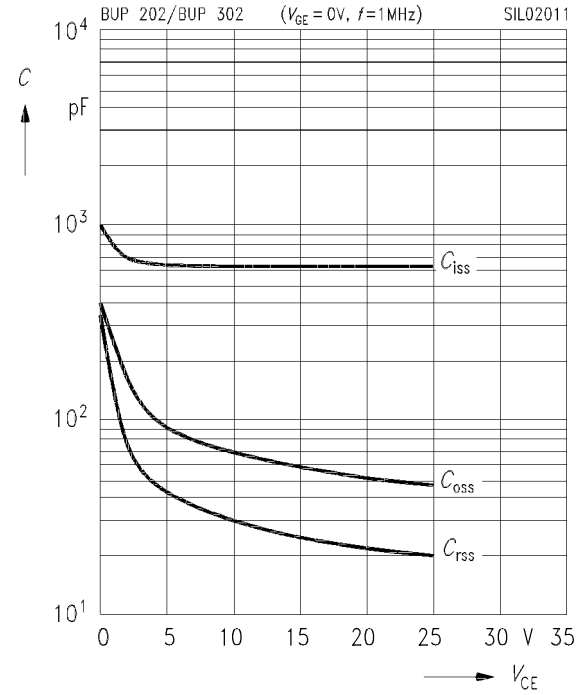
Typ. saturation characteristics
$V_{CE\,(sat)} = f(V_{GE})$
parameter: T_j = 125 °C



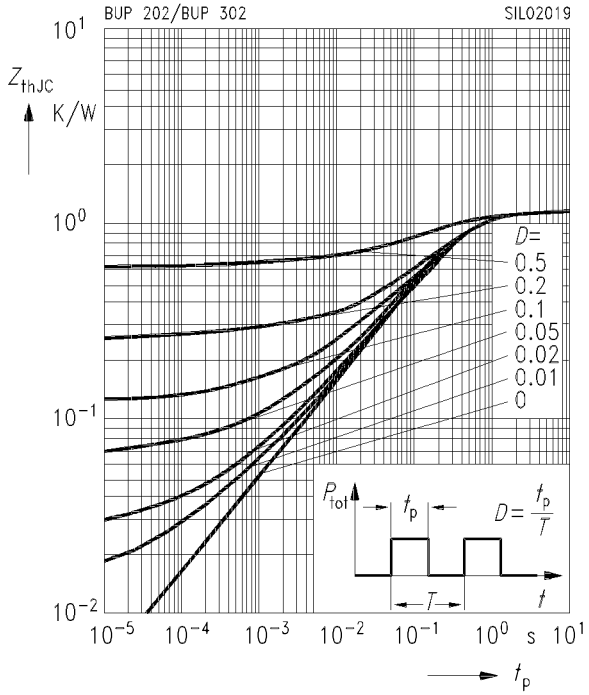
Typ. transfer characteristics
$I_C = f(V_{GE})$
parameter: t_p = 80 µs, V_{CE} = 20 V



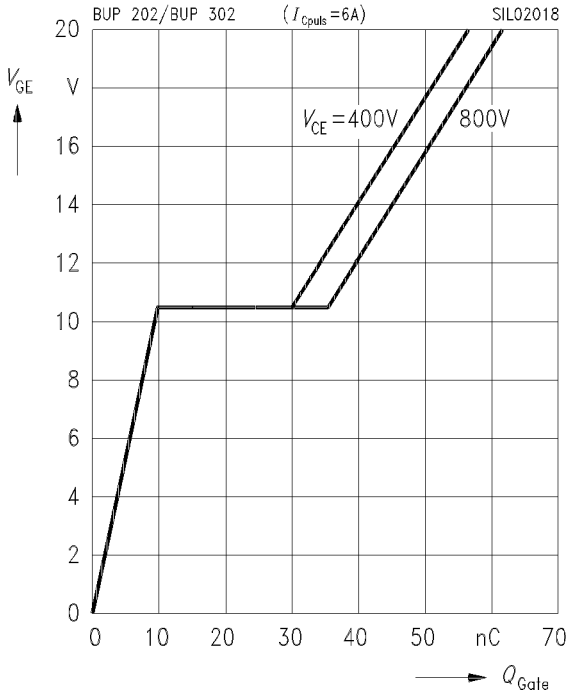
Typ. capacitances
$C = f(V_{CE})$
parameter: V_{GE} = 0 V, f = 1 MHz



Transient thermal impedance
$Z_{th\,JC} = f(t_p)$
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 °C, V_{CE} = 600 V,
V_{GE} = ± 15 V, I_C = 5 A