IGBT

Preliminary data

- Low forward voltage drop
- High switching speed
- Low tail current
- Latch-up free
- Avalanche rated

VPT05155
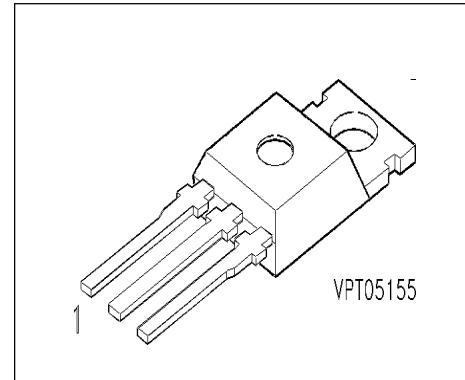
	Pin 1	Pin 2	Pin 3
	G	C	E

Type	V_{CE}	I_C	Package	Ordering Code
BUP 203	1000V	23A	TO-220 AB	Q67078-A4402-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CE}	1000	V
Collector-gate voltage $R_{GE} = 20 \text{ k}\Omega$	V_{CGR}	1200	
Gate-emitter voltage	V_{GE}	± 20	
DC collector current $T_C = 25 \text{ °C}$ $T_C = 90 \text{ °C}$	I_C	23 15	A
Pulsed collector current, $t_p = 1 \text{ ms}$ $T_C = 25 \text{ °C}$ $T_C = 90 \text{ °C}$	I_{Cpuls}	46 30	
Avalanche energy, single pulse $I_C = 10 \text{ A}$, $V_{CC} = 24 \text{ V}$, $R_{GE} = 25 \ \Omega$ $L = 3 \text{ mH}$, $T_j = 25 \text{ °C}$	E_{AS}	20	mJ
Power dissipation $T_C = 25 \text{ °C}$	P_{tot}	165	W
Chip or operating temperature	T_j	-55 ... + 150	°C
Storage temperature	T_{stg}	-55 ... + 150	

Maximum Ratings

Parameter	Symbol	Values	Unit
DIN humidity category, DIN 40 040	-	E	-
IEC climatic category, DIN IEC 68-1	-	55 / 150 / 56	

Thermal Resistance

Parameter	Symbol	Values	Unit
IGBT thermal resistance, chip case	R_{thJC}	≤ 0.63	K/W

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Gate threshold voltage	$V_{GE(th)}$				V
$V_{GE} = V_{CE,}$ I_C = 0.7 mA		4.5	5.5	6.5	
Collector-emitter saturation voltage	$V_{CE(sat)}$				
V_{GE} = 15 V, I_C = 10 A, T_j = 25 °C		-	2.8	3.3	
V_{GE} = 15 V, I_C = 10 A, T_j = 125 °C		-	3.8	4.3	
V_{GE} = 15 V, I_C = 10 A, T_j = 150 °C		-	4	4.5	
Zero gate voltage collector current	I_{CES}				µA
V_{CE} = 1000 V, V_{GE} = 0 V, T_j = 25 °C		-	-	150	
V_{CE} = 1000 V, V_{GE} = 0 V, T_j = 125 °C		-	-	700	
Gate-emitter leakage current	I_{GES}				nA
V_{GE} = 20 V, V_{CE} = 0 V		-	0.1	100	
AC Characteristics					
Transconductance	g_{fs}				S
V_{CE} = 20 V, I_C = 10 A		3.5	5.5	-	
Input capacitance	C_{iss}				pF
V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		-	1300	1750	
Output capacitance	C_{oss}				
V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		-	100	150	
Reverse transfer capacitance	C_{rss}				
V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		-	50	75	

Electrical Characteristics, at $T_j = 25\,°C$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Switching Characteristics, Inductive Load at $T_j = 125\,°C$

Parameter	Symbol	min.	typ.	max.	Unit
Turn-on delay time $V_{CC} = 600$ V, $V_{GE} = 15$ V, $I_C = 10$ A $R_{Gon} = 47\ \Omega$	$t_{d(on)}$	-	40	60	ns
Rise time $V_{CC} = 600$ V, $V_{GE} = 15$ V, $I_C = 10$ A $R_{Gon} = 47\ \Omega$	t_r	-	30	50	
Turn-off delay time $V_{CC} = 600$ V, $V_{GE} = -15$ V, $I_C = 10$ A $R_{Goff} = 47\ \Omega$	$t_{d(off)}$	-	200	300	
Fall time $V_{CC} = 600$ V, $V_{GE} = -15$ V, $I_C = 10$ A $R_{Goff} = 47\ \Omega$	t_f	-	20	30	
Total turn-off loss energy $V_{CC} = 600$ V, $V_{GE} = -15$ V, $I_C = 10$ A $R_{Goff} = 47\ \Omega$	E_{off}	-	1.3	-	mWs

Power dissipation

$P_{tot} = f(T_C)$
parameter: $T_j \leq 150\ °C$
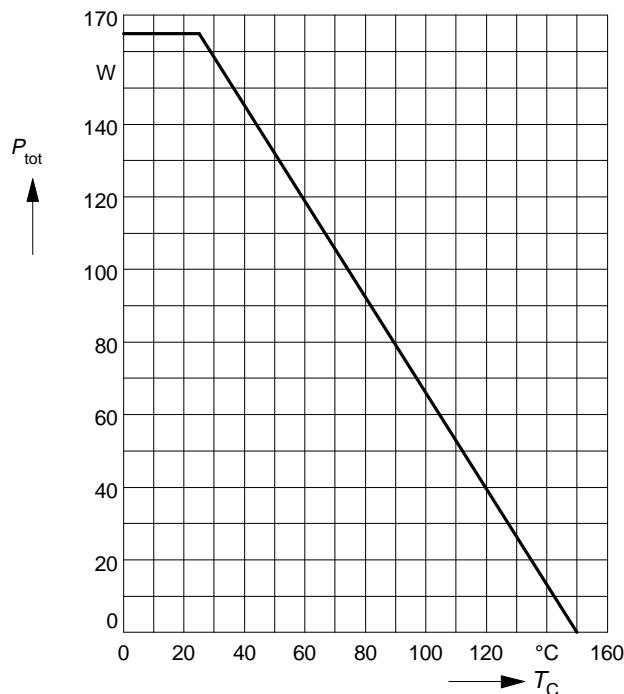
Collector current

$I_C = f(T_C)$
parameter: $V_{GE} \geq 15\ V$, $T_j \leq 150\ °C$
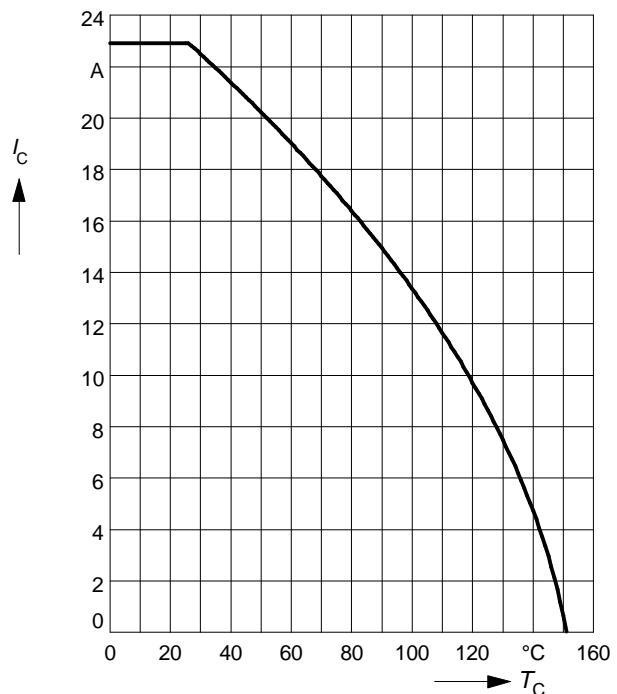
Safe operating area

$I_C = f(V_{CE})$
parameter: $D = 0$, $T_C = 25°C$, $T_j \leq 150\ °C$
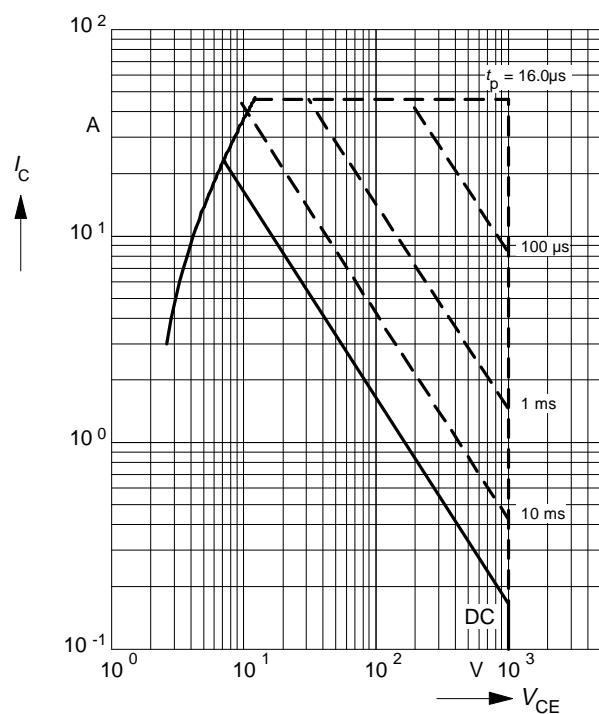

Transient thermal impedance   IGBT

$Z_{th\ JC} = f(t_p)$
parameter: $D = t_p / T$
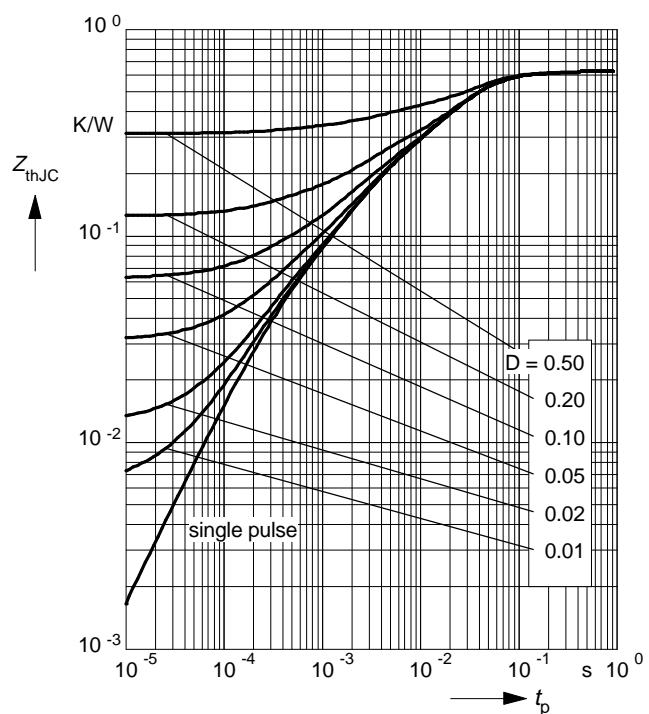
Typ. output characteristics

$I_C = f(V_{CE})$

parameter: $t_p = 80$ µs, $T_j = 125$ °C
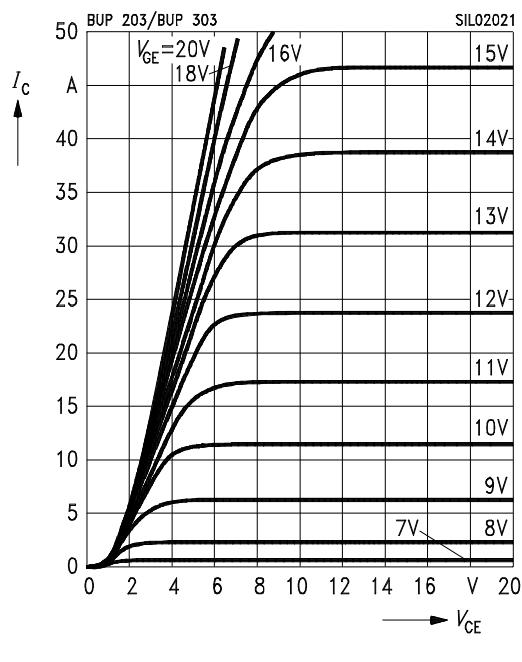
Typ. transfer characteristics

$I_C = f(V_{GE})$

parameter: $t_P = 80$ µs, $V_{CE} = 20$ V, $T_j = 25$ °C
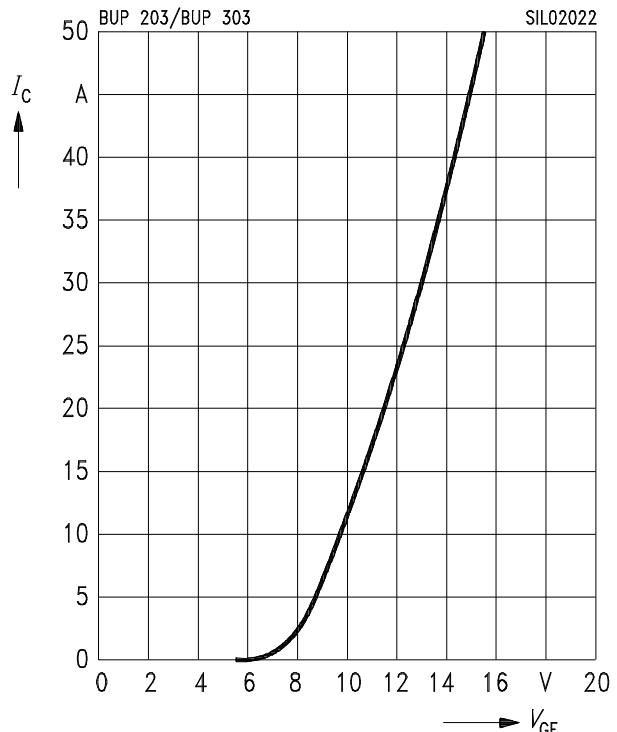
Typ. saturation characteristics

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

parameter: $T_j = 25$ °C
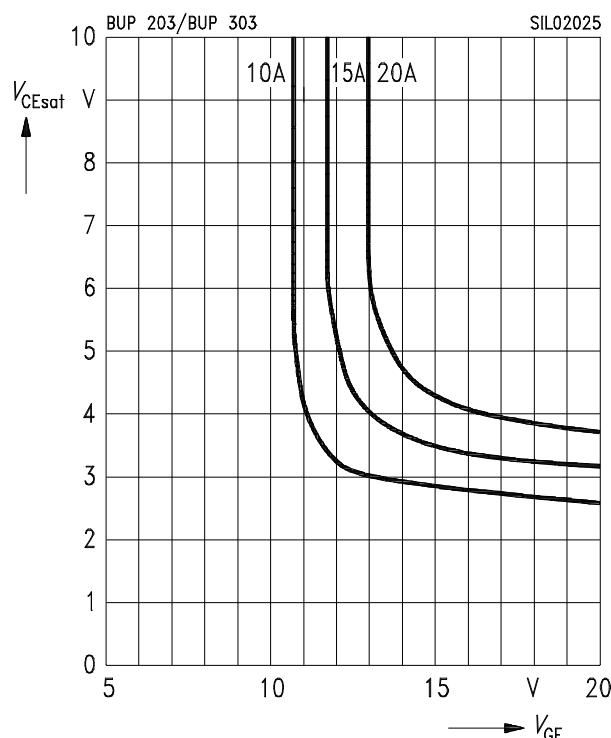
## Typ. saturation characteristics

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

parameter: $T_j = 125$ °C
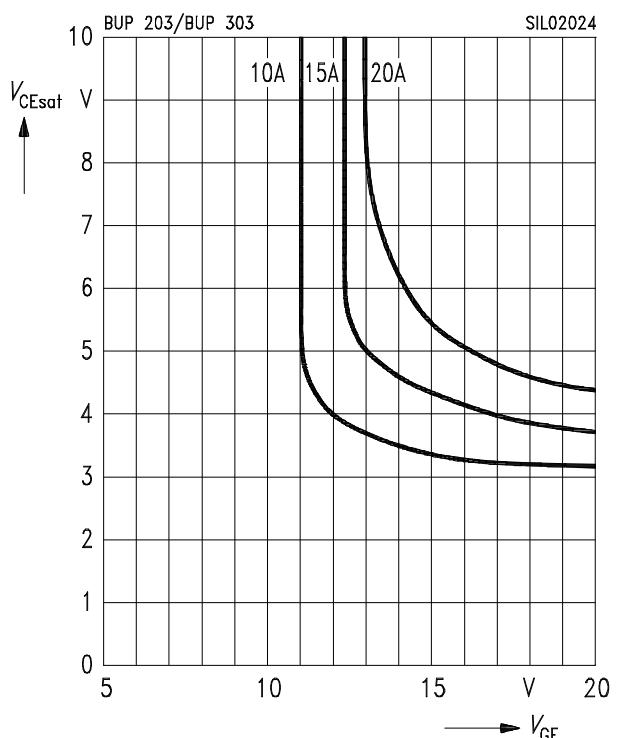
Typ. gate charge

$V_{GE} = f(Q_{Gate})$
parameter: $I_{C\ puls}$ = 10 A
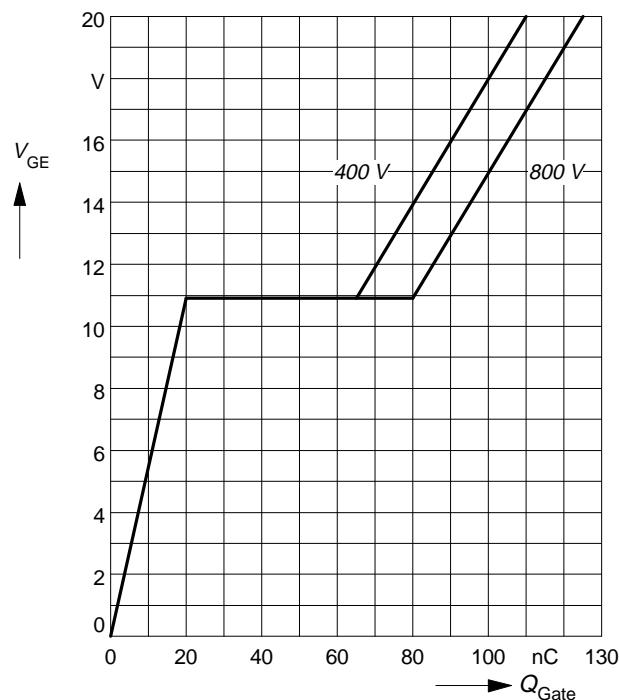

Typ. capacitances

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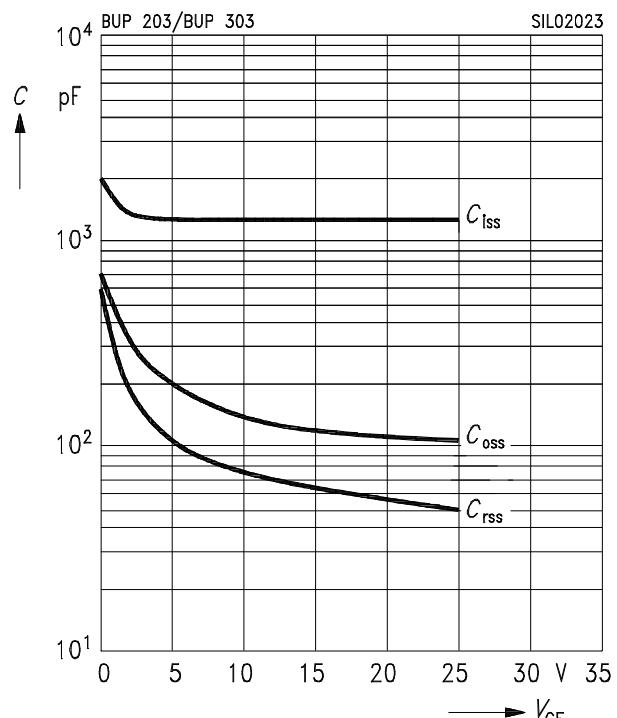
Typ. switching time

$t = f\ (R_G)$, inductive load, T_j = 125 °C
parameter: V_{CE} = 600 V, V_{GE} = ± 15 V, I_C = 10 A
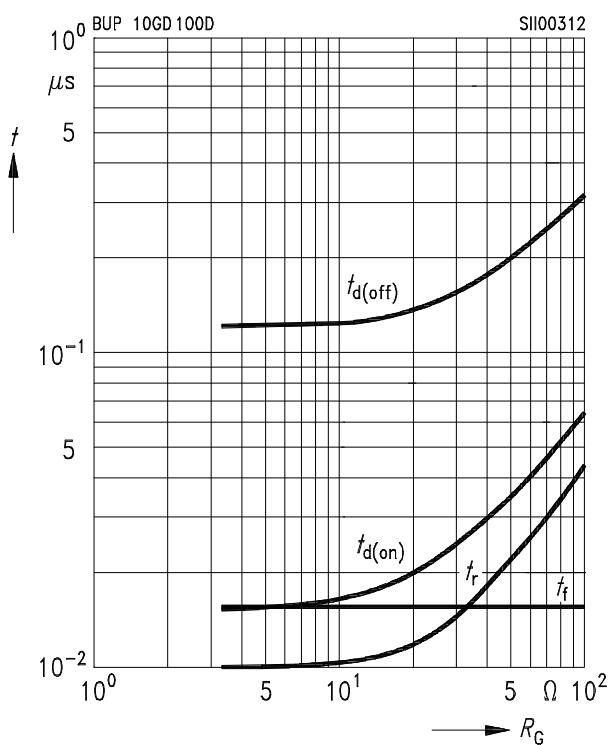
Package Outlines
Dimensions in mm
Weight: 8 g
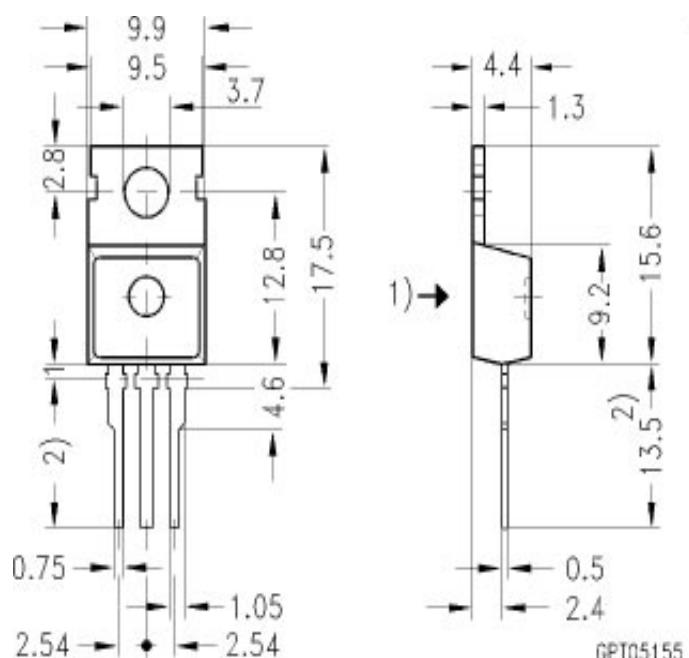
1) punch direction, burr max. 0.04
2) dip tinning
3) max. 14.5 by dip tinning press burr max. 0.05