## Features

● N channel
● Enhancement mode
● Temperature sensor with thyristor characteristic
● The drain pin is electrically shorted to the tab
● AEC qualified
● Green product (RoHS compliant)

AEC Qualified

RoHS
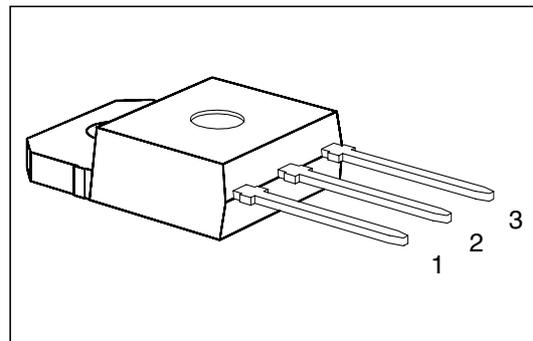
Pin	1	2	3
	G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	Package	
BTS 240A	50 V	58 A	0.018 Ω	PG-TO-218	

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	50	V
Drain-gate voltage, R_{GS} = 20 kΩ	V_{DGR}	50	
Gate-source voltage	V_{GS}	$\pm$ 20	
Continuous drain current, T_C = 73 °C	I_D	58	A
ISO drain current T_C = 85 °C, V_{GS} = 10 V, V_{DS} = 0.5 V	$I_{D\text{-ISO}}$	21.0	
Pulsed drain current, T_C = 25 °C	$I_{D\ puls}$	232	
Short circuit current, T_j = − 55 ... + 150 °C	I_{SC}	147	
Short circuit dissipation, T_j = − 55 ... + 150 °C	P_{SCmax}	2200	W
Power dissipation	P_{tot}	170	
Operating and storage temperature range	T_j, T_{stg}	− 55 ... + 150	°C
Thermal resistance Chip-case Chip-ambient	$R_{th\ JC}$ $R_{th\ JA}$	$\leq$ 0.74 $\leq$ 45	K/W

Electrical Characteristics

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Static Characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Drain-source breakdown voltage $V_{GS} = 0$, $I_D = 0.25$ mA	$V_{(BR)DSS}$	50	–	–	V
Gate threshold voltage $V_{GS} = V_{DS}$, $I_D = 1$ mA	$V_{GS(th)}$	2.5	3.0	3.5	
Zero gate voltage drain current $V_{GS} = 0$ V, $V_{DS} = 50$ V	I_{DSS}				µA
$\qquad T_j = 25\,°C$		–	0.1	1.0	
$\qquad T_j = 125\,°C$		–	10	100	
Gate-source leakage current $V_{GS} = 20$ V, $V_{DS} = 0$	I_{GSS}				
$\qquad T_j = 25\,°C$		–	10	100	nA
$\qquad T_j = 150\,°C$		–	2.0	4.0	µA
Drain-source on-state resistance $V_{GS} = 10$ V, $I_D = 47$ A	$R_{DS(on)}$	–	0.012	0.018	Ω

Dynamic Characteristics

Parameter	Symbol	min.	typ.	max.	Unit
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, $I_D = 47$ A	g_{fs}	20.0	43.0	–	S
Input capacitance $V_{GS} = 0$, $V_{DS} = 25$ V, $f = 1$ MHz	C_{iss}	–	2.9	4.3	nF
Output capacitance $V_{GS} = 0$, $V_{DS} = 25$ V, $f = 1$ MHz	C_{oss}	–	1.4	2.1	
Reverse transfer capacitance $V_{GS} = 0$, $V_{DS} = 25$ V, $f = 1$ MHz	C_{rss}	–	0.5	0.8	
Turn-on time t_{on}, ($t_{on} = t_{d(on)} + t_r$) $V_{CC} = 30$ V, $V_{GS} = 10$ V, $I_D = 3$ A, $R_{GS} = 50\ \Omega$	$t_{d(on)}$	–	50	75	ns
	t_r	–	150	230	
Turn-off time t_{off}, ($t_{off} = t_{d(off)} + t_f$) $V_{CC} = 30$ V, $V_{GS} = 10$ V, $I_D = 3$ A, $R_{GS} = 50\ \Omega$	$t_{d(off)}$	–	350	560	
	t_f	–	250	330	

Electrical Characteristics (cont'd)

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Reverse Diode

Parameter	Symbol	min.	typ.	max.	Unit
Continuous source current	I_S	–	–	58	A
Pulsed source current	I_{SM}	–	–	232	
Diode forward on-voltage $I_F = 58\ \text{A}$, $V_{GS} = 0$	V_{SD}		– 	 1.4	 1.8	V
Reverse recovery time $I_F = I_S$, $\text{d}i_F/\text{d}t = 100\ \text{A/µs}$, $V_R = 30\ \text{V}$	t_{rr}	 –	 100	 –	ns
Reverse recovery charge $I_F = I_S$, $\text{d}i_F/\text{d}t = 100\ \text{A/µs}$, $V_R = 30\ \text{V}$	Q_{rr}	 –	 0.3	 –	µC

Temperature Sensor

| Parameter	Symbol	min.	typ.	max.	Unit
Forward voltage $I_{TS(on)} = 10\ \text{mA}$, $T_j = -55 \ldots +150\ °\text{C}$ Sensor override, $t_p \leq 100\ \text{µs}$ $T_j = -55 \ldots +160\ °\text{C}$	$V_{TS(on)}$	0.7 –	1.4 –	1.5 10	V
Forward current $T_j = -55 \ldots +150\ °\text{C}$ Sensor override, $t_p \leq 100\ \text{µs}$ $T_j = -55 \ldots +160\ °\text{C}$	$I_{TS(on)}$	 – –	 – –	 10 600	mA
Holding current, $V_{TS(off)} = 5\ \text{V}$, $T_j = 25\ °\text{C}$ $T_j = 150\ °\text{C}$	I_H	0.05 0.05	0.1 0.2	0.5 0.3	
Switching temperature $V_{TS} = 5\ \text{V}$	$T_{TS(on)}$	 150	 –	 –	°C
Turn-off time $V_{TS} = 5\ \text{V}$, $I_{TS(on)} = 2\ \text{mA}$	t_{off}	 0.5	 –	 2.5	µs

Examples for short-circuit protection

at $T_\text{j} = -55 ... +150\,°C$, unless otherwise specified.

Parameter	Symbol	Examples			Unit
		1	**2**	–	
Drain-source voltage	V_DS	15	30	–	V
Gate-source voltage	V_GS	6.4	5.1	–	
Short-circuit current	I_SC	< 147	< 67	–	A
Short-circuit dissipation	P_SC	< 2200	< 2000	–	W
Response time $T_\text{j} = 25\,°C$, before short circuit	$t_\text{SC(off)}$	< 25	< 25	–	ms

Short-circuit protection $I_\text{SC} = f(V_\text{DS})$
Parameter: V_GS
Diagram to determine I_SC for $T_\text{j} = -55...+150°C$
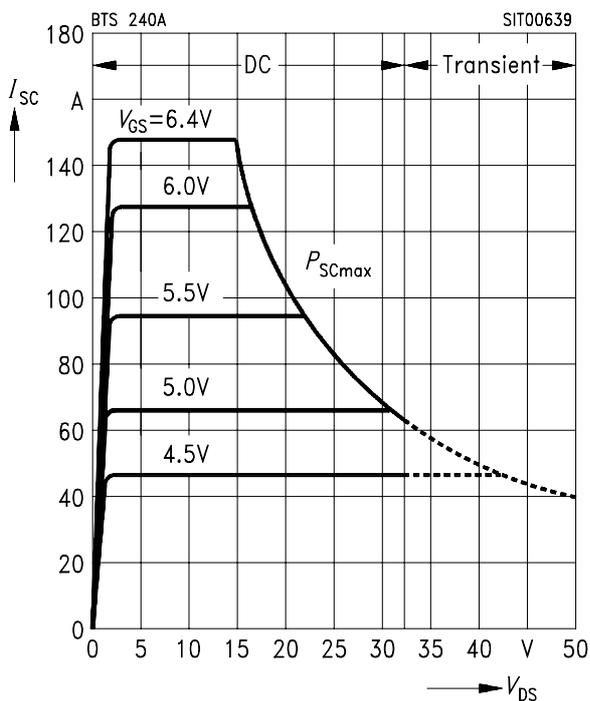
Max. gate voltage $V_\text{GS(SC)} = f(V_\text{DS})$
Parameter: $T_\text{j} = -55 ... +150\,°C$
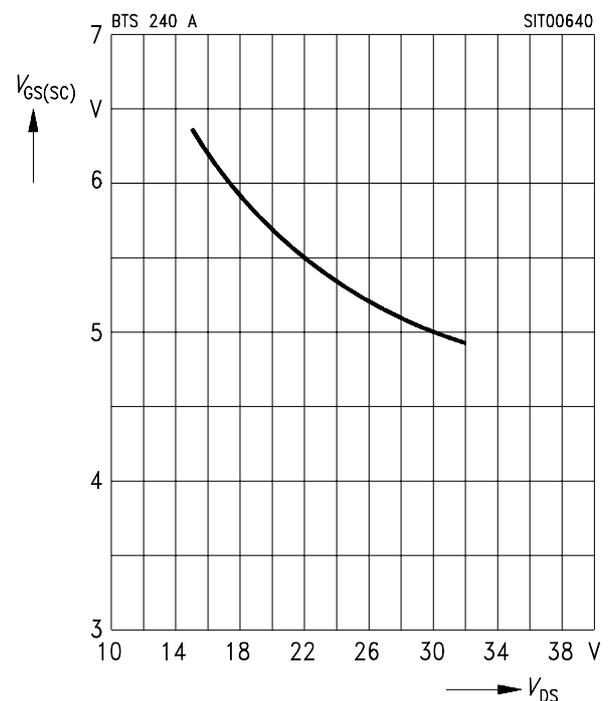
Max. power dissipation $P_{\text{tot}} = f(T_{\text{C}})$
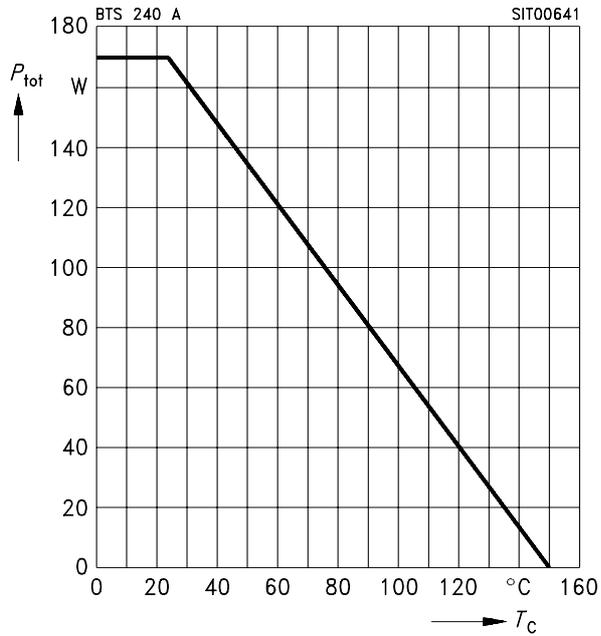
Typ. drain-source on-state resistance
$R_{\text{DS(on)}} = f(I_{\text{D}})$
Parameter: V_{GS}
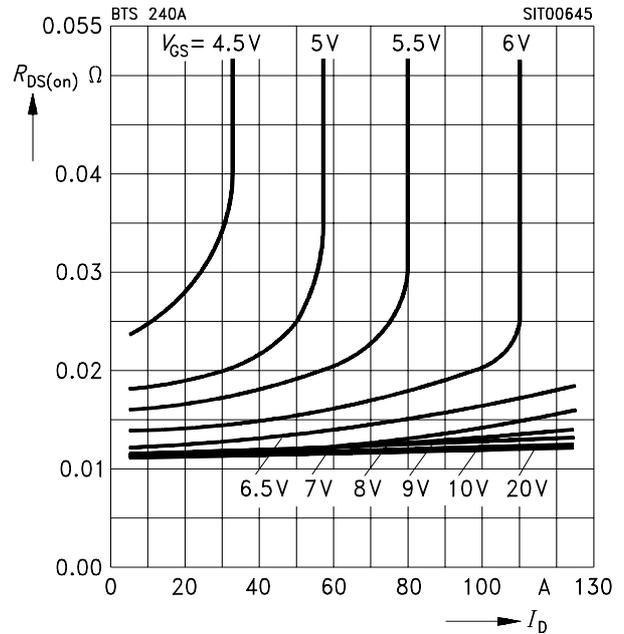
Typical output characteristics $I_{\text{D}} = f(V_{\text{DS}})$
Parameter: $t_{\text{p}} = 80\ \mu\text{s}$
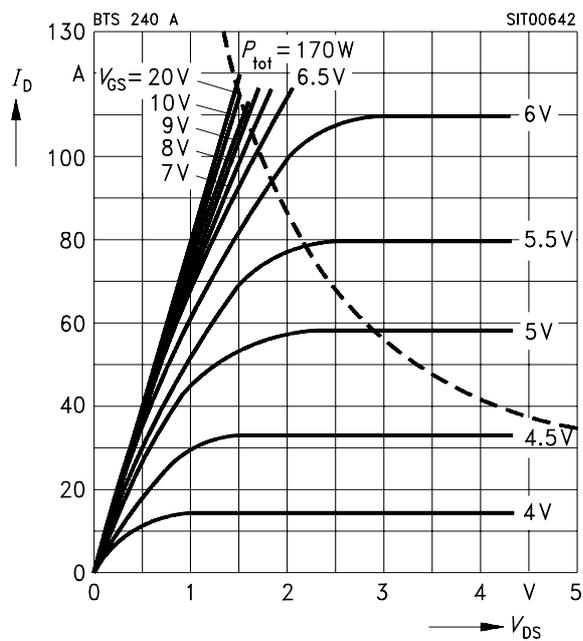
Safe operating area $I_{\text{D}} = f(V_{\text{DS}})$
Parameter: $D = 0.01$, $T_{\text{C}} = 25\ °\text{C}$
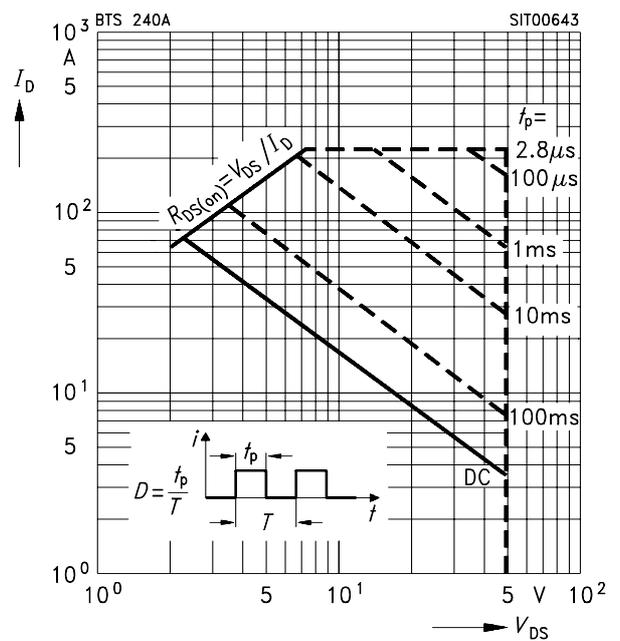
Drain-source on-state resistance
$R_{DS(on)} = f(T_j)$
Parameter: $I_D = 47$ A, $V_{GS} = 10$ V (spread)
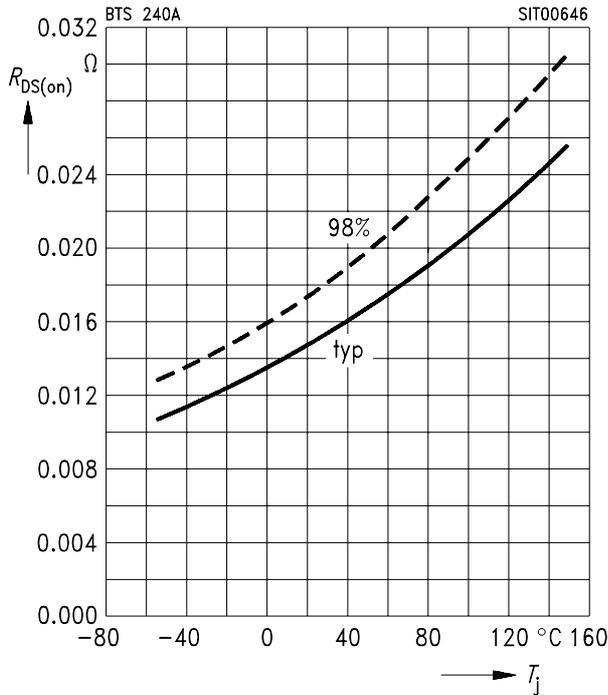
Gate threshold voltage $V_{GS(th)} = f(T_j)$
Parameter: $V_{DS} = V_{GS}$, $I_D = 1$ mA
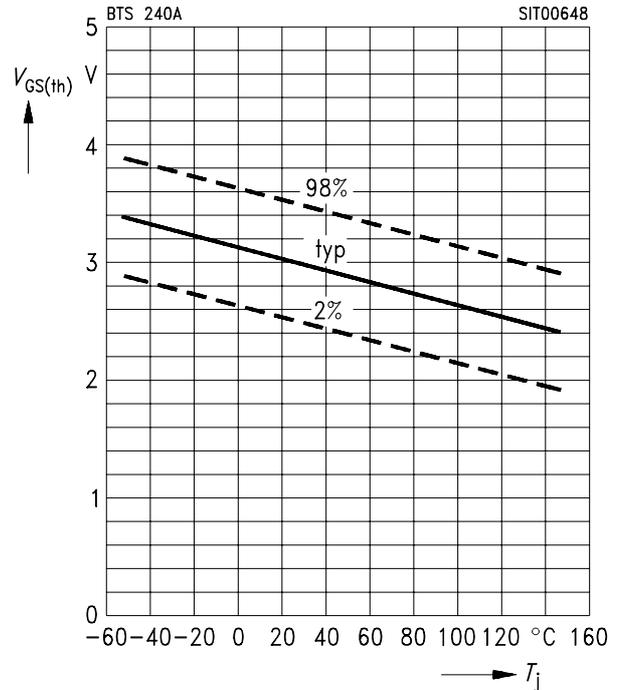
Typ. transfer characteristic
$I_D = f(V_{GS})$
Parameter: $t_p = 80$ µs, $V_{DS} = 25$ V
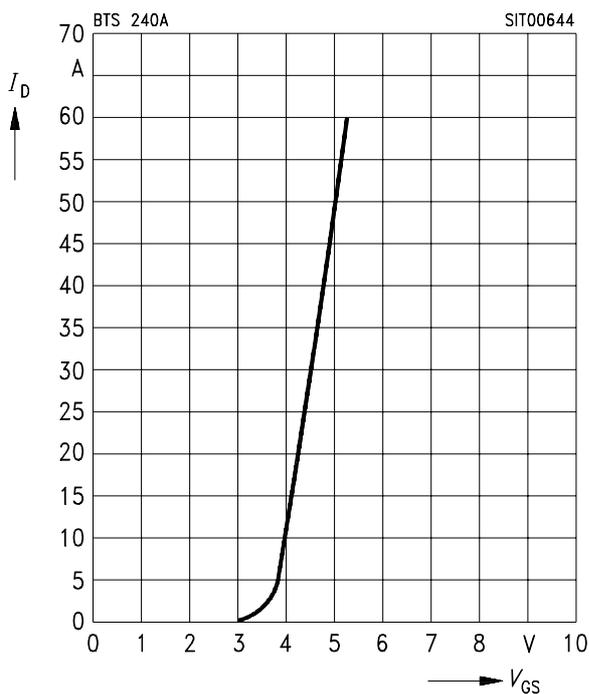
Typ. transconductance $g_{fs} = f(I_D)$
Parameter: $t_p = 80$ µs, $V_{DS} = 25$ V
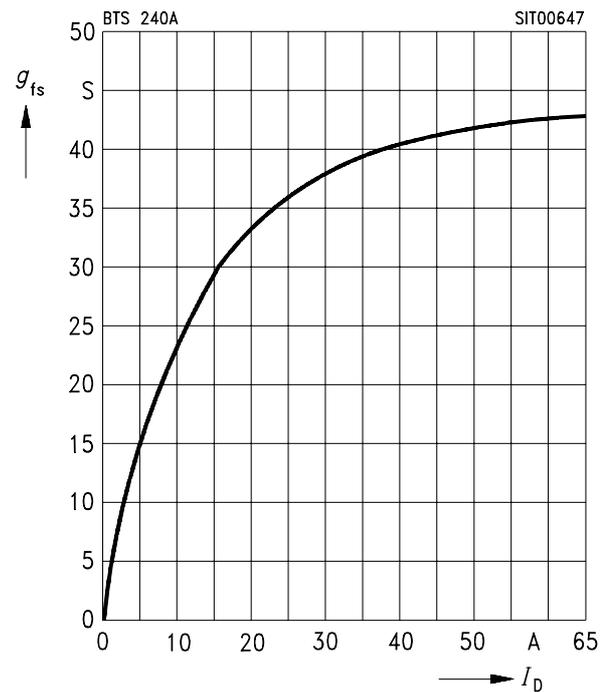
Continuous drain current $I_D = f(T_C)$
Parameter: $V_{GS} \geq 10$ V
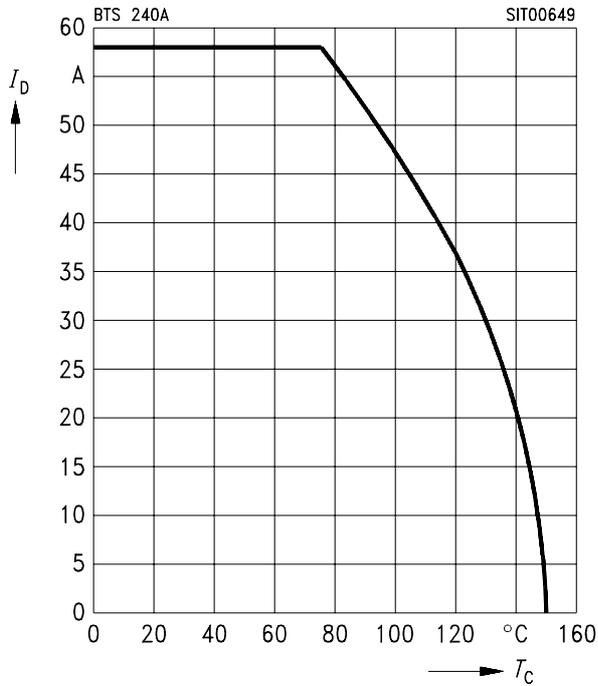
Forward characteristics of reverse diode
$I_F = f(V_{SD})$
Parameter: T_j, $t_p = 80$ μs (spread)
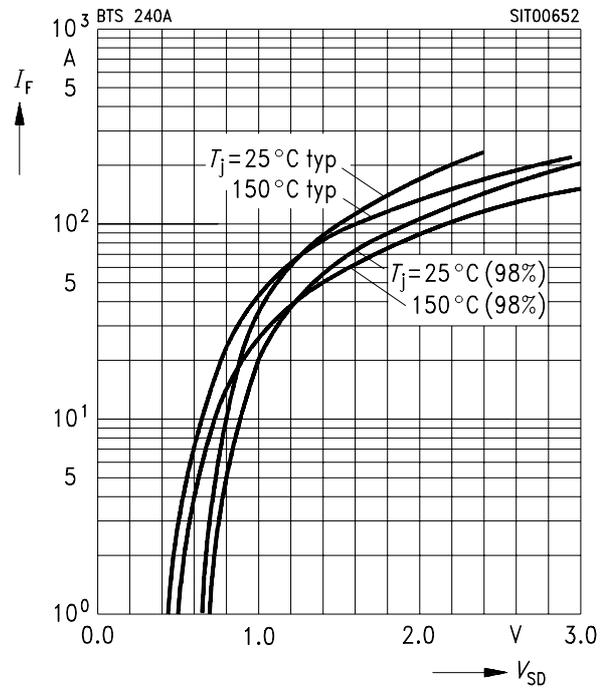
Typ. gate-source leakage current
$I_{GSS} = f(T_C)$
Parameter: $V_{GS} = 20$ V, $V_{DS} = 0$
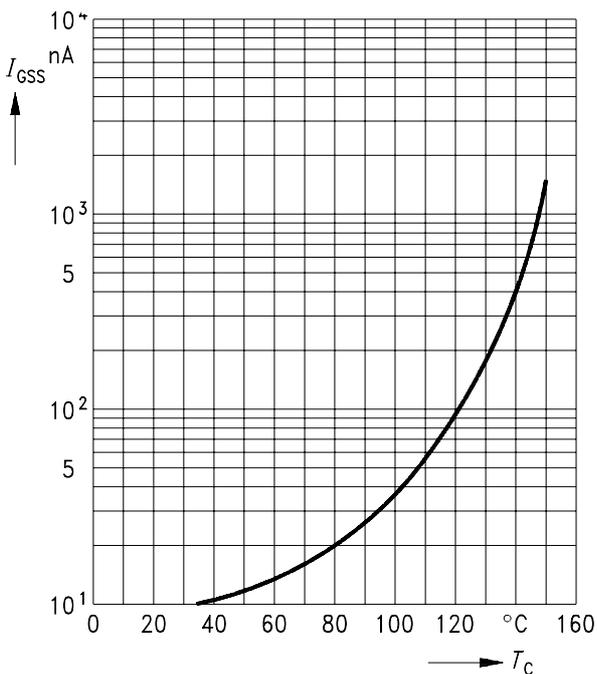
Typ. capacitances $C = f(V_{DS})$
Parameter: $V_{GS} = 0$, $f = 1$ MHz
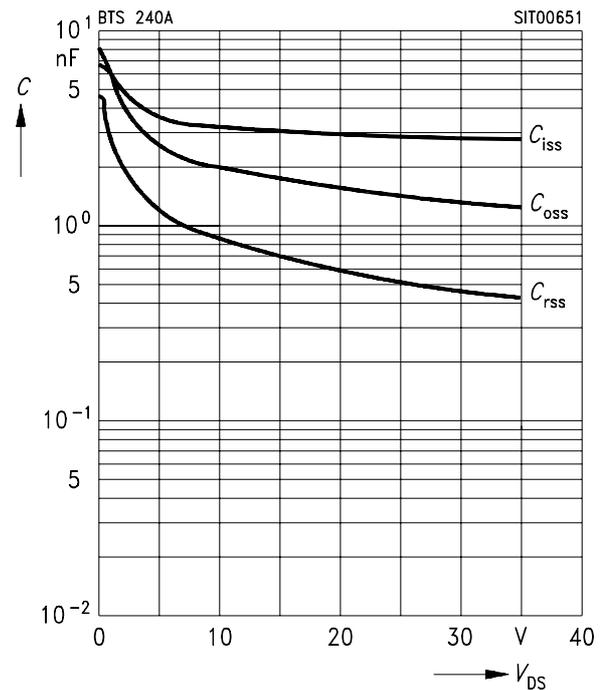
Transient thermal impedance $Z_{thJC} = f(t_p)$

Parameter: $D = t_p/T$

1 Package Outlines

1) Punch direction, burr max. 0.04
2) Dip tinning
3) Max. 15.5 by dip tinning
   press burr max. 0.05
   radii not dimensioned max. 0.2

GPT05156
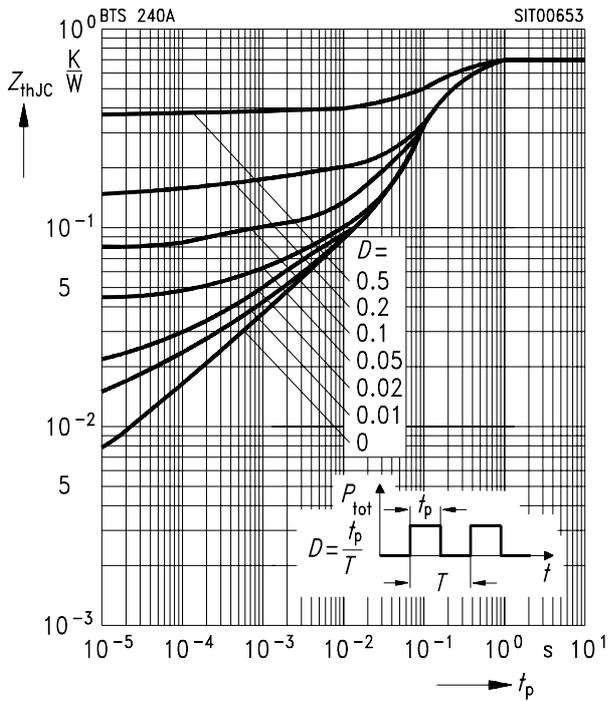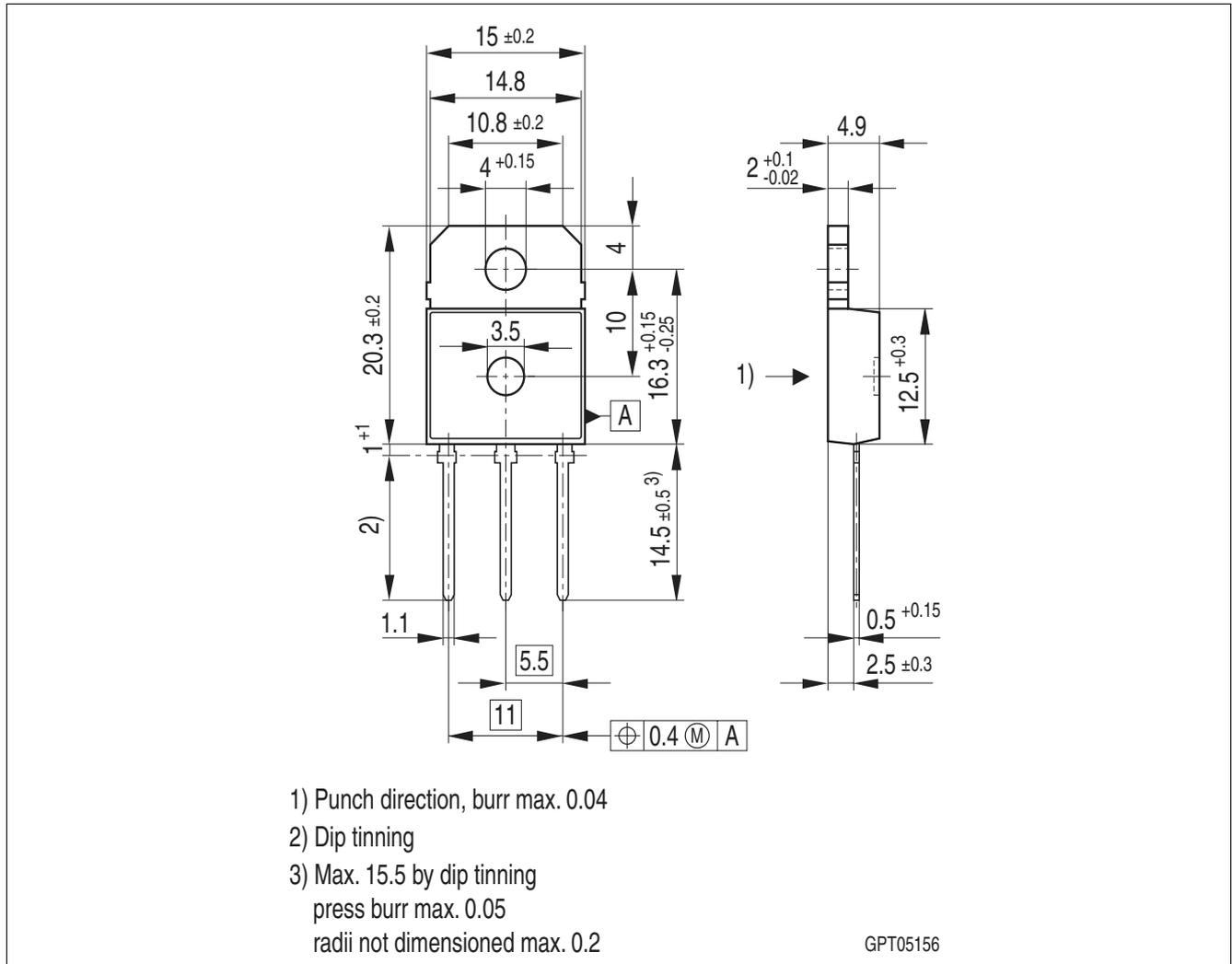
Figure 1   PG-TO218-3

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

You can find all of our packages, sorts of packing and others in our
Infineon Internet Page "Products": **http://www.infineon.com/products**.   Dimensions in mm

2 Revision History

Version	Date	Changes
Rev. 1.2	2010-07-12	initial released version of RoHS compliant derivative of BTS240A Page 1 and 9: added RoHS compliance statement and Green product feature Page 1 and 9: Package changed to RoHS compliant version Page 1: removed Package parameter (humidity and climatic) Page 10: added Revision history Page 11: updated Disclaimer

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