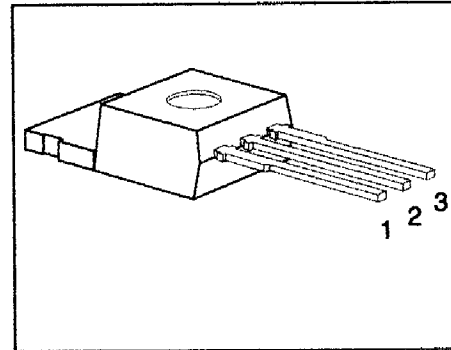


BTS 140A

Features

- N channel
- Enhancement mode
- Temperature sensor with thyristor characteristic
- The drain pin is electrically shorted to the tab



Pin	1	2	3
	G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	Package
BTS 140A	50 V	42 A	0.028 Ω	TO-220AB

Maximum Ratings

Parameter	Symbol	Values	Unit
Drain-source voltage	V_{DS}	50	V
Drain-gate voltage, $R_{GS} = 20 \text{ k}\Omega$	V_{DGR}	50	
Gate-source voltage	V_{GS}	± 20	
Continuous drain current, $T_C = 65 \text{ }^\circ\text{C}$	I_D	42	A
ISO drain current $T_C = 85 \text{ }^\circ\text{C}$, $V_{GS} = 10 \text{ V}$, $V_{DS} = 0.5 \text{ V}$	I_{D-ISO}	13.5	
Pulsed drain current, $T_C = 25 \text{ }^\circ\text{C}$	$I_{D \text{ puls}}$	168	
Short circuit current, $T_J = -55 \dots +150 \text{ }^\circ\text{C}$	I_{SC}	80	
Short circuit dissipation, $T_J = -55 \dots +150 \text{ }^\circ\text{C}$	P_{SCmax}	1200	W
Power dissipation	P_{tot}	125	
Operating and storage temperature range	T_J, T_{stg}	$-55 \dots +150$	$^\circ\text{C}$
DIN humidity category, DIN 40 040	—	E	—
IEC climatic category, DIN IEC 68-1	—	55/150/56	
Thermal resistance			K/W
Chip-case	$R_{th \text{ JC}}$	≤ 1.0	
Chip-ambient	$R_{th \text{ JA}}$	≤ 75	

Electrical Characteristics

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Static Characteristics

Drain-source breakdown voltage $V_{GS} = 0, I_D = 0.25\text{ mA}$	$V_{(BR)DSS}$	50	–	–	V
Gate threshold voltage $V_{GS} = V_{DS}, I_D = 1\text{ mA}$	$V_{GS(th)}$	2.5	3.0	3.5	
Zero gate voltage drain current $V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}$ $T_j = 25\text{ }^\circ\text{C}$ $T_j = 125\text{ }^\circ\text{C}$	I_{DSS}	–	0.1 10	1.0 100	μA
Gate-source leakage current $V_{GS} = \pm 20\text{ V}, V_{DS} = 0$ $T_j = 25\text{ }^\circ\text{C}$ $T_j = 150\text{ }^\circ\text{C}$	I_{GSS}	–	10 2.0	100 4.0	nA μA
Drain-source on-state resistance $V_{GS} = 10\text{ V}, I_D = 32\text{ A}$	$R_{DS(on)}$	–	0.024	0.028	Ω

Dynamic Characteristics

Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}, I_D = 32\text{ A}$	g_{fs}	12	26	–	S
Input capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	C_{iss}	–	1800	2400	μF
Output capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	C_{oss}	–	800	1200	
Reverse transfer capacitance $V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	C_{rbs}	–	280	450	
Turn-on time t_{on} , ($t_{on} = t_{d(on)} + t_r$) $V_{CC} = 25\text{ V}, V_{GS} = 10\text{ V}, I_D = 3\text{ A}, R_{GS} = 50\text{ }\Omega$	$t_{d(on)}$	–	35	50	ns
	t_r	–	85	130	
Turn-off time t_{off} , ($t_{off} = t_{d(off)} + t_f$) $V_{CC} = 25\text{ V}, V_{GS} = 10\text{ V}, I_D = 3\text{ A}, R_{GS} = 50\text{ }\Omega$	$t_{d(off)}$	–	220	280	
	t_f	–	140	180	

Electrical Characteristics (cont'd)

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Reverse Diode

Continuous source current	I_S	–	–	42	A
Pulsed source current	I_{SM}	–	–	168	
Diode forward on-voltage $I_F = 84\text{ A}$, $V_{GS} = 0$	V_{SD}	–	1.8	2.2	V
Reverse recovery time $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	t_{rr}	–	80	–	ns
Reverse recovery charge $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	Q_{rr}	–	0.14	–	μC

Temperature Sensor

Forward voltage $I_{TS(on)} = 10\text{ mA}$, $T_j = -55 \dots +150\text{ }^\circ\text{C}$ Sensor override, $t_p \leq 100\text{ }\mu\text{s}$ $T_j = -55 \dots +160\text{ }^\circ\text{C}$	$V_{TS(on)}$	–	1.4	1.50	V
		–	–	10	
Forward current $T_j = -55 \dots +150\text{ }^\circ\text{C}$ Sensor override, $t_p \leq 100\text{ }\mu\text{s}$ $T_j = -55 \dots +160\text{ }^\circ\text{C}$	$I_{TS(on)}$	–	–	5	mA
		–	–	600	
Holding current, $V_{TS(off)} = 5\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$ $T_j = 150\text{ }^\circ\text{C}$	I_H	0.05	0.1	0.5	
		0.05	0.2	0.3	
Switching temperature $V_{TS} = 5\text{ V}$	$T_{TS(on)}$	150	–	–	$^\circ\text{C}$
Turn-off time $V_{TS} = 5\text{ V}$, $I_{TS(on)} = 2\text{ mA}$	t_{off}	0.5	–	2.5	μs