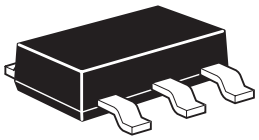
BSP75G
60V self-protected low-side IntelliFET™ MOSFET switch

Summary

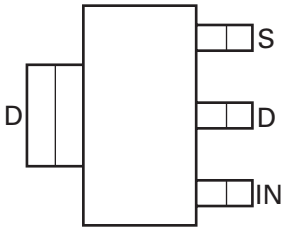
Continuous drain source voltage	**V_{DS}=60V**
On-state resistance	**550mΩ**
Nominal load current	**1.4A (V_{IN} = 5V)**
Clamping energy	**550mJ**



SOT223

Description

Self-protected low side MOSFET. Monolithic over temperature, over current, over voltage (active clamp) and ESD protected logic level power MOSFET intended as a general purpose switch.



Features

- Short circuit protection with auto restart
- Over-voltage protection (active clamp)
- Thermal shutdown with auto restart
- Over-current protection
- Input protection (ESD)
- High continuous current rating
- Load dump protection (actively protects load)
- Logic level input

Note:

The tab is connected to the drain pin, and must be electrically isolated from the source pin. Connection of significant copper to the tab is recommended for best thermal performance.

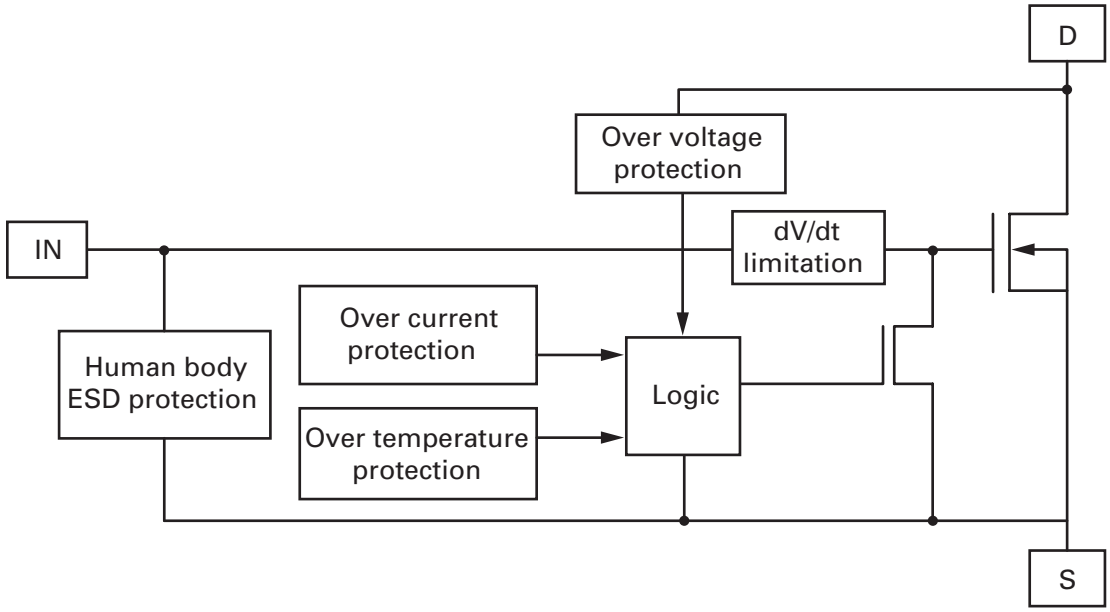
Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
BSP75GTA	7	12mm embossed	1,000
BSP75GTC	13	12mm embossed	4,000

Device marking

BSP75G

Functional block diagram



Applications

- Especially suited for loads with a high in-rush current such as lamps and motors.
- All types of resistive, inductive and capacitive loads in switching applications.
- µC compatible power switch for 12V and 24V DC applications.
- Automotive rated.
- Replaces electromechanical relays and discrete circuits.
- Linear mode capability - the current-limiting protection circuitry is designed to de-activate at low Vds, in order not to compromise the load current during normal operation. The design maximum DC operating current is therefore determined by the thermal capability of the package/board combination, rather than by the protection circuitry.

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Continuous drain-source voltage	V_{DS}	60	V
Drain-source voltage for short circuit protection	$V_{DS(SC)}$	36	V
Continuous input voltage	V_{IN}	-0.2 ... +10	V
Peak input voltage	V_{IN}	-0.2 ... +20	V
Operating temperature range	T_j,	-40 to +150	°C
Storage temperature range	T_{stg}	-55 to +150	°C
Power dissipation at T_A =25°C[(a)]	P_D	2.5	W
Continuous drain current @ V_{IN}=10V; T_A=25°C[(a)]	I_D	1.6	A
Continuous drain current @ V_{IN}=5V; T_A=25°C[(a)]	I_D	1.4	A
Pulsed drain current @ V_{IN}=10V	I_{DM}	5	A
Continuous source current (body diode)[(a)]	I_S	3	A
Pulsed source current (body diode)	I_S	5	A
Unclamped single pulse inductive energy	E_{AS}	550	mJ
Load dump protection	$V_{LoadDump}$	80	V
Electrostatic discharge (human body model)	V_{ESD}	4000	V
DIN humidity category, DIN 40 040		E	
IEC climatic category, DIN IEC 68-1		40/150/56	

Thermal resistance

Parameter	Symbol	Limit	Unit
Junction to ambient[(a)]	$R_{\Theta JA}$	50	°C/W
Junction to ambient[(b)]	$R_{\Theta JA}$	24	°C/W
Junction to ambient[(c)]	$R_{\Theta JA}$	208	°C/W

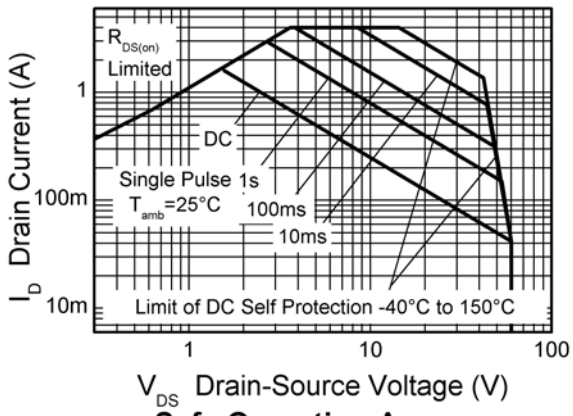
NOTES:

(a) For a device surface mounted on 37mm x 37mm x 1.6mm FR4 board with a high coverage of single sided 2oz weight copper.

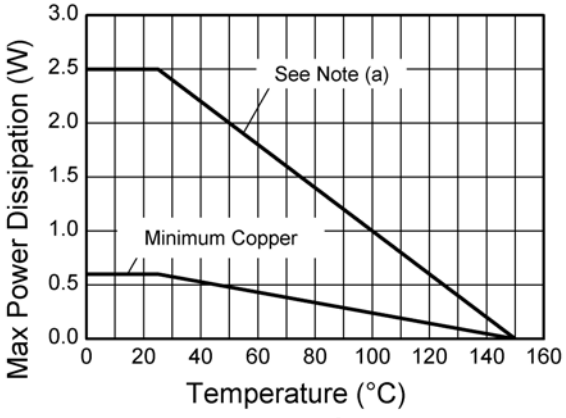
(b) For a device surface mounted on FR4 board and measured at t<=10s.

(c) For a device mounted on FR4 board with the minimum copper required for electrical connections.

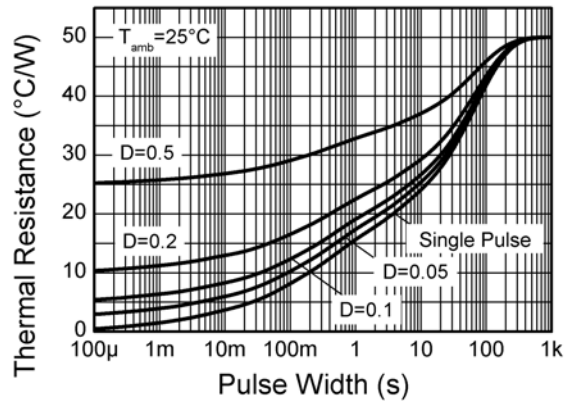
Characteristics



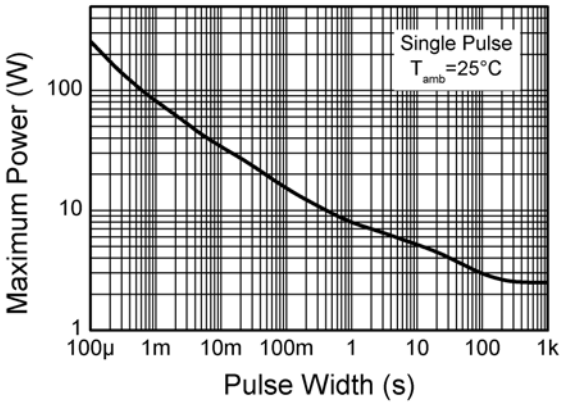
Safe Operating Area



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

Electrical characteristics (at Tamb = 25°C unless otherwise stated)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Static characteristics						
Drain-source clamp voltage	$V_{DS(AZ)}$	60	70	75	V	I_D=10mA
Off-state drain current	I_{DSS}		0.1	3	μA	V_{DS}=12V, V_{IN}=0V
Off-state drain current	I_{DSS}		3	15	μA	V_{DS}=32V, V_{IN}=0V
Input threshold voltage (*)	$V_{IN(th)}$	1	2.1		V	V_{DS}=V_{GS}, I_D=1mA
Input current	I_{IN}		0.7	1.2	mA	V_{IN}=+5V
Input current	I_{IN}		1.5	2.7	mA	V_{IN}=+7V
Input current	I_{IN}		4	7	mA	V_{IN}=+10V
Static drain-source on-state resistance	$R_{DS(on)}$		520	675	mΩ	V_{IN}=+5V, I_D=0.7A
Static drain-source on-state resistance	$R_{DS(on)}$		385	550	mΩ	V_{IN}=+10V, I_D=0.7A
Current limit (†)	$I_{D(LIM)}$	0.7	1.1	1.75	A	V_{IN}=+5V, V_{DS}>5V
Current limit(†)	$I_{D(LIM)}$	2	3	4	A	V_{IN}=+10V, V_{DS}>5V
Dynamic characteristics						
Turn-on time (V_{IN} to 90% I_D)	t_{on}		2.2	10	μs	R_L=22Ω, V_{DD}=12V, V_{IN}=0 to +10V
Turn-off time (V_{IN} to 90% I_D)	t_{off}		13	20	μs	R_L=22Ω, V_{DD}=12V, V_{IN}=+10V to 0V
Slew rate on (70 to 50% V_{DD})	$-dV_{DS}/dt_{on}$		10	20	V/μs	R_L=22Ω, V_{DD}=12V, V_{IN}=0 to +10V
Slew rate off (50 to 70% V_{DD})	dV_{DS}/dt_{off}		3.2	10	V/μs	R_L=22Ω, V_{DD}=12V, V_{IN}=+10V to 0V
Protection functions (‡)						
Required input voltage for over temperature protection	V_{PROT}	4.5			V	
Thermal overload trip temperature	T_{JT}	150	175		°C	
Thermal hysteresis			10		°C	
Unclamped single pulse inductive energy Tj=25°C	E_{AS}	550			mJ	$I_{D(ISO)}$=0.7A, V_{DD}=32V
Unclamped single pulse inductive energy Tj=150°C	E_{AS}	200			mJ	$I_{D(ISO)}$=0.7A, V_{DD}=32V
Inverse diode						
Source drain voltage	V_{SD}				1	V_{IN}=0V, $-I_D$=1.4A

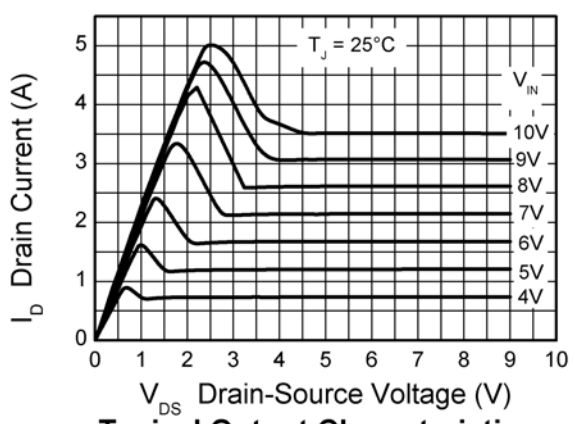
NOTES:

(*) Protection features may operate outside spec for V_{IN}<4.5V.

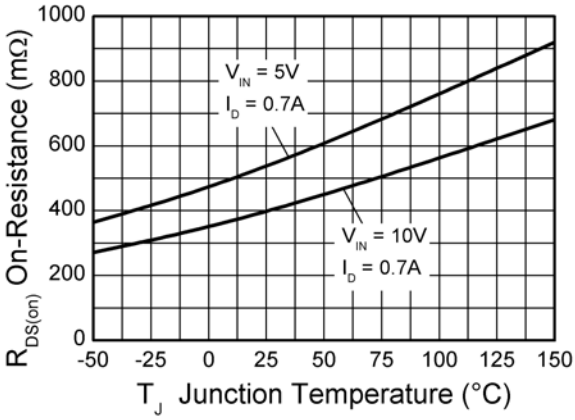
(†) The drain current is limited to a reduced value when V_{DS} exceeds a safe level.

(‡) Integrated protection functions are designed to prevent IC destruction under fault conditions described in the datasheet. Fault conditions are considered as "outside" normal operating range. Protection functions are not designed for continuous, repetitive operation.

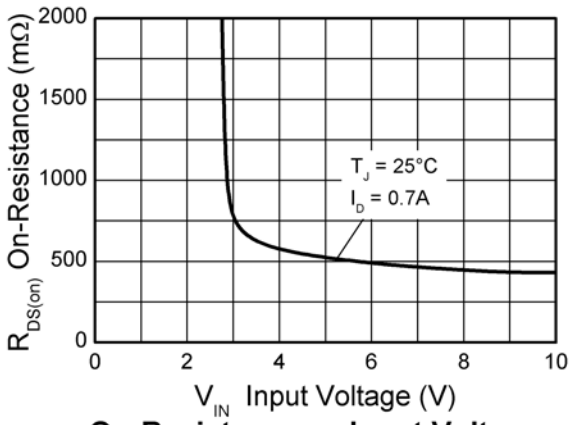
Characteristics



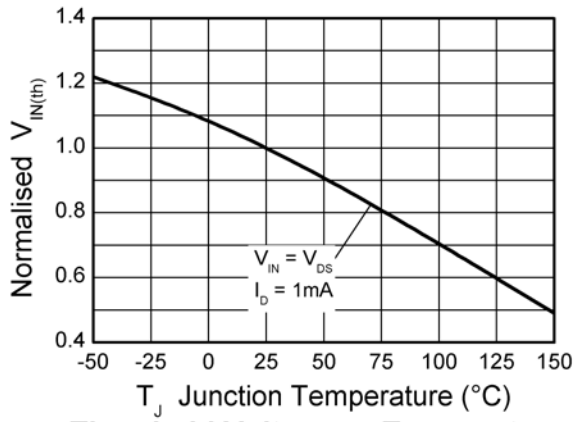
Typical Output Characteristic



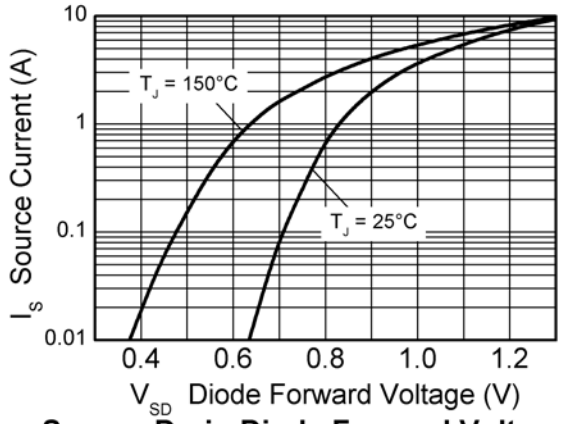
On-state Resistance vs Temperature



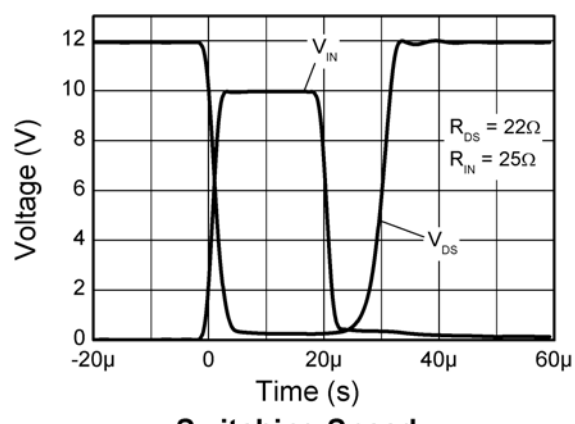
On-Resistance vs Input Voltage



Threshold Voltage vs Temperature



Source-Drain Diode Forward Voltage



Switching Speed

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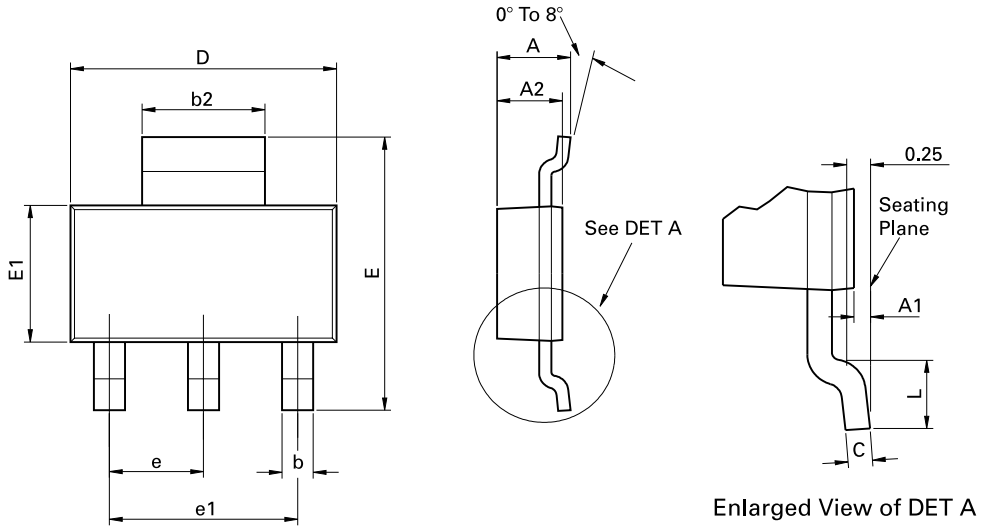
Package outline - SOT223



Conforms to JEDEC TO-261 AA Issue B

Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	-	1.80	-	0.071	e	2.30 BSC		0.0905 BSC	
A1	0.02	0.10	0.0008	0.004	e1	4.60 BSC		0.181 BSC	
b	0.66	0.84	0.026	0.033	E	6.70	7.30	0.264	0.287
b2	2.90	3.10	0.114	0.122	E1	3.30	3.70	0.130	0.146
C	0.23	0.33	0.009	0.013	L	0.90	-	0.355	-
D	6.30	6.70	0.248	0.264	-	-	-	-	-

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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