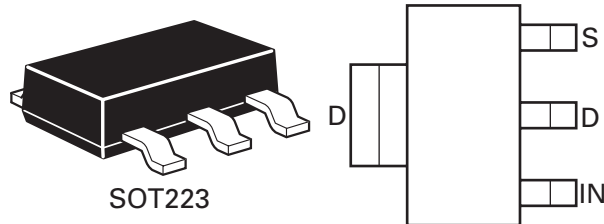


BSP75G

60V N-channel self-protected enhancement mode IntelliFET™ MOSFET

Summary

Continuous drain source voltage	$V_{DS}=60V$
On-state resistance	550m Ω
Nominal load current	1.6A
Clamping energy	550mJ



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

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

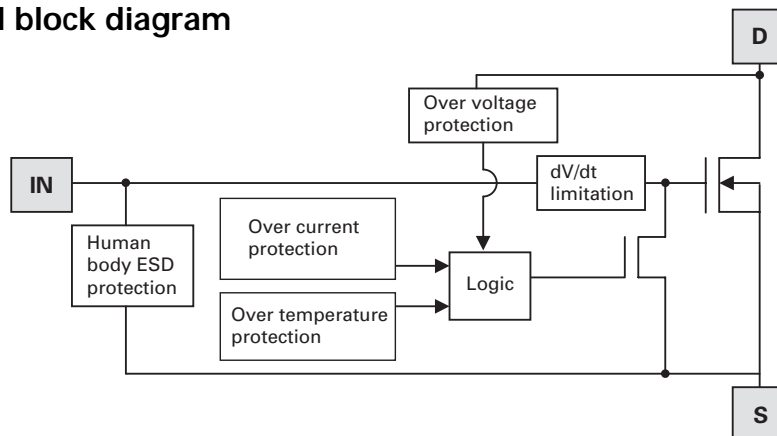
Note:

Drain tab may be electrically isolated provided electrical connection is made to the drain pin, and thermal connection to the drain tab is maintained to ensure thermal performance.

Applications

- Especially suited for loads with a high inrush 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 and for 42V powernet
- Automotive rated
- Replaces electromechanical relays and discrete circuits

Functional block diagram



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 $T_A = 25^\circ\text{C}^*$	P_D	2.5	W
Continuous drain current @ $V_{IN}=10\text{V}; T_A=25^\circ\text{C}^*$	I_D	1.6	A
Continuous drain current @ $V_{IN}=5\text{V}; T_A=25^\circ\text{C}^*$	I_D	1.4	A
Pulsed drain current @ $V_{IN}=10\text{V}$	I_{DM}	5	A
Continuous source current (body diode)*	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

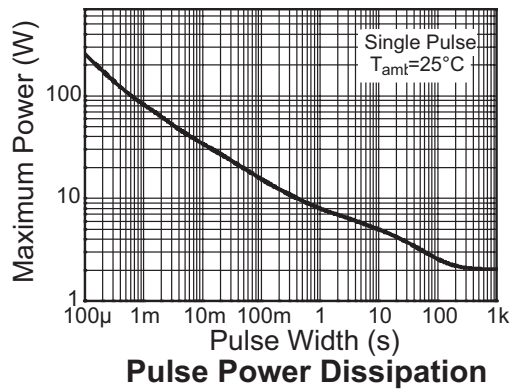
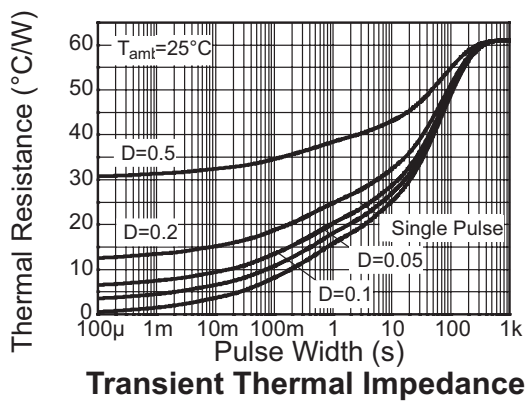
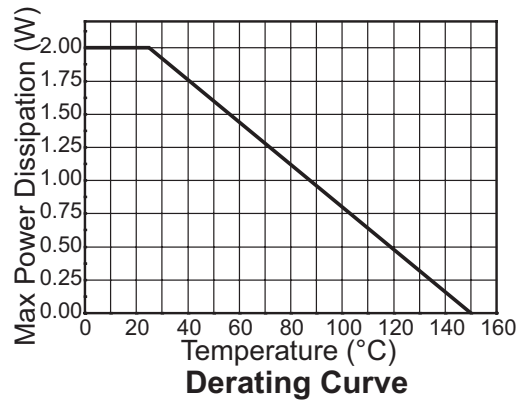
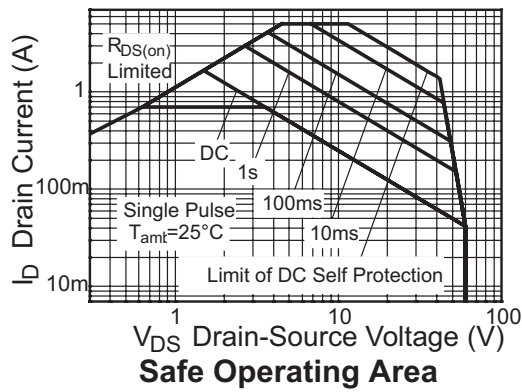
Parameter	Symbol	Value	Unit
Junction to Ambient*	R_{JA}	50	°C/W
Junction to Ambient†	R_{JA}	34	°C/W

NOTES:

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

† For a device surface mounted on FR4 board and measured at $t \leq 10\text{s}$.

Characteristics



Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Static Characteristics						
Drain-source clamp voltage	$V_{DS(AZ)}$	60	70	75	V	$I_D=10\text{mA}$
Off state drain current	I_{DSS}		0.1	3	μA	$V_{DS}=12\text{V}$, $V_{IN}=0\text{V}$
Off state drain current	I_{DSS}		3	15	μA	$V_{DS}=32\text{V}$, $V_{IN}=0\text{V}$
Input threshold voltage*	$V_{IN(th)}$	1	2.1		V	$V_{DS}=V_{GS}$, $I_D=1\text{mA}$
Input current	I_{IN}		0.7	1.2	mA	$V_{IN}=+5\text{V}$
Input current	I_{IN}		1.5	2.7	mA	$V_{IN}=+7\text{V}$
Input current	I_{IN}		4	7	mA	$V_{IN}=+10\text{V}$
Static drain-source on-state resistance	$R_{DS(on)}$		520	675	$\text{m}\Omega$	$V_{IN}=5\text{V}$, $I_D=0.7\text{A}$
Static drain-source on-state resistance	$R_{DS(on)}$		385	550	$\text{m}\Omega$	$V_{IN}=10\text{V}$, $I_D=0.7\text{A}$
Current limit [†]	$I_{D(LIM)}$	0.7	1.1	1.75	A	$V_{IN}=5\text{V}$, $V_{DS}>5\text{V}$
Current limit [†]	$I_{D(LIM)}$	2	3	4	A	$V_{IN}=10\text{V}$, $V_{DS}>5\text{V}$
Dynamic characteristics						
Turn-on time (V_{IN} to 90% I_D)	t_{on}		2.2	10	μs	$R_L=22\Omega$, $V_{IN}=0$ to 10V , $V_{DD}=12\text{V}$
Turn-off time (V_{IN} to 90% I_D)	t_{off}		13	20	μs	$R_L=22\Omega$, $V_{IN}=10\text{V}$ to 0V , $V_{DD}=12\text{V}$
Slew rate on (70 to 50% V_{DD})	$-dV_{DS}/dt_{on}$		10	20	$\text{V}/\mu\text{s}$	$R_L=22\Omega$, $V_{IN}=0$ to 10V , $V_{DD}=12\text{V}$
Slew rate off (50 to 70% V_{DD})	dV_{DS}/dt_{on}		3.2	10	$\text{V}/\mu\text{s}$	$R_L=22\Omega$, $V_{IN}=10\text{V}$ to 0V , $V_{DD}=12\text{V}$

Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated) (Continued)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Protection Functions[‡]						
Required input voltage for over temperature protection	V_{PROT}	4.5			V	
Thermal Overload trip temperature	T_{JT}	150	175		$^{\circ}\text{C}$	
Thermal hysteresis			10		$^{\circ}\text{C}$	
Unclamped single pulse inductive energy $T_j=25^{\circ}\text{C}$	E_{AS}	550			mJ	$I_{D(ISO)}=0.7\text{A}$, $V_{DD}=32\text{V}$
Unclamped single pulse inductive energy $T_j=150^{\circ}\text{C}$	E_{AS}	200			mJ	$I_{D(ISO)}=0.7\text{A}$, $V_{DD}=32\text{V}$
Inverse Diode						
Source drain voltage	V_{SD}				1	$V_{IN}=0\text{V}$, $-I_D=1.4\text{A}$

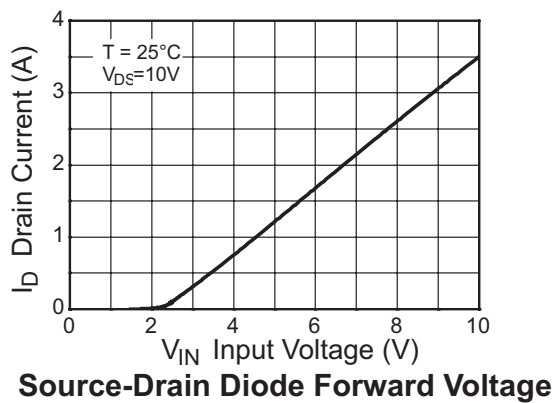
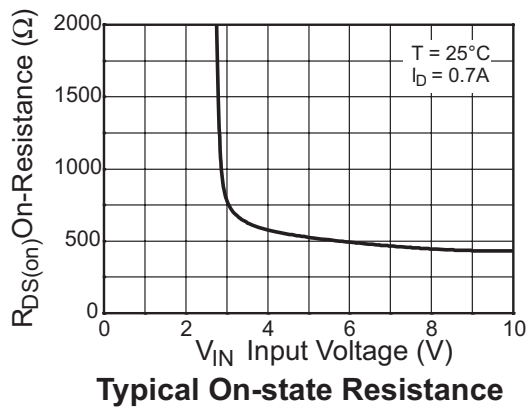
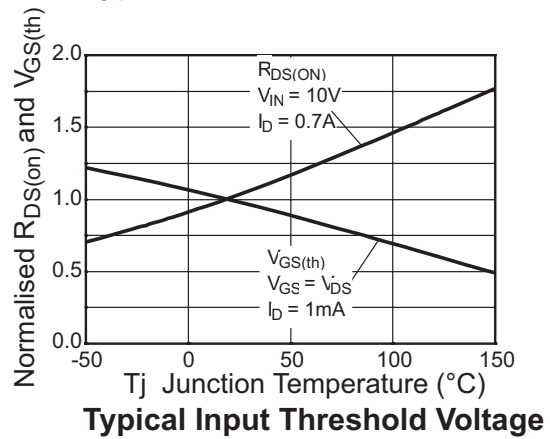
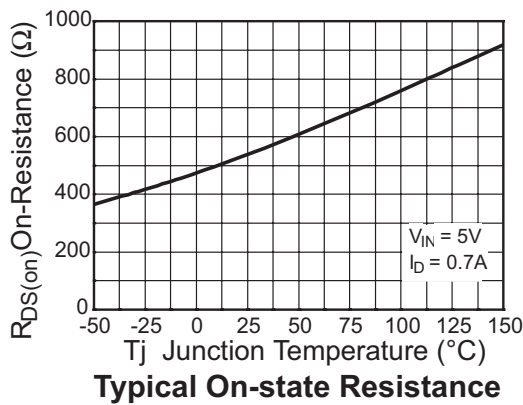
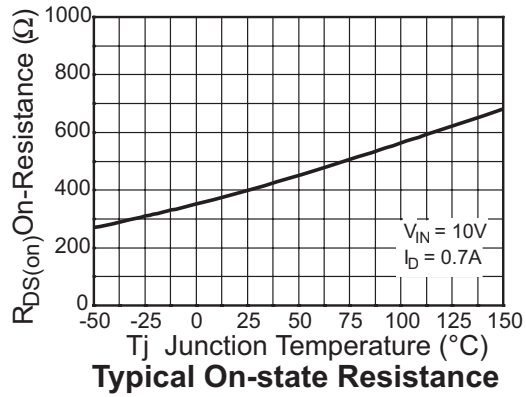
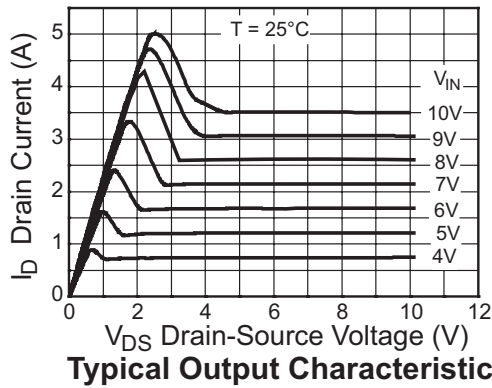
NOTES:

* Protection features may operate outside spec for $V_{IN}<4.5\text{V}$.

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

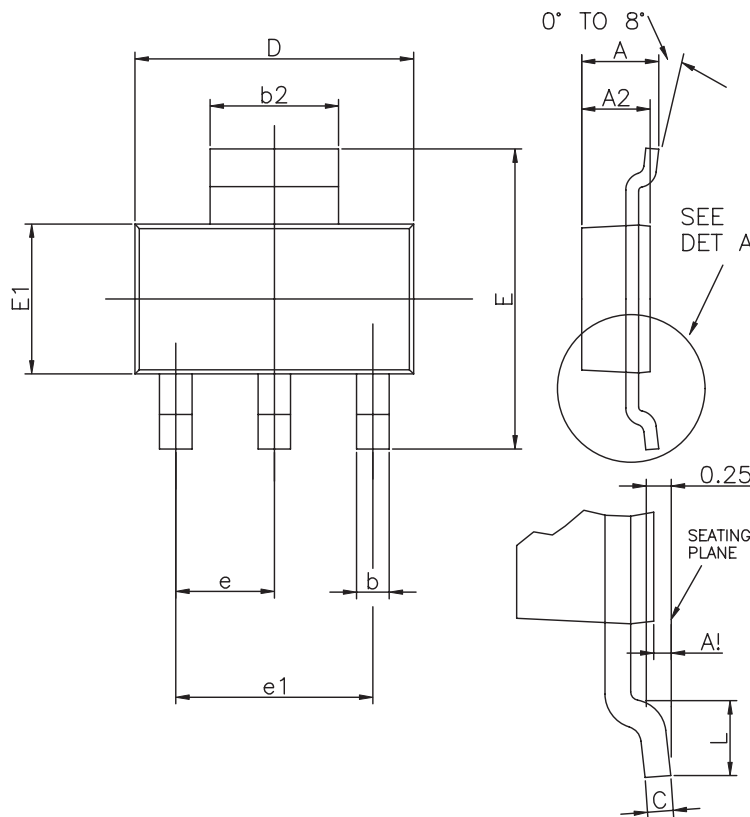
‡ Integrated protection functions are designed to prevent IC destruction under fault conditions described in the datasheet. Fault conditions are considered as "outside" normal operating range. Protection functions are not designed for continuous, repetitive operation.

Typical characteristics



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Packaging details



ENLARGED VIEW OF DET A

CONFORMS TO
JEDEC TO-261 AA ISSUE B

DIM	MILLIMETRES	
	MIN	MAX
A	—	1.80
A1	0.02	0.10
A2	1.55	1.65
b	0.66	0.84
b2	2.90	3.10
C	0.23	0.33
D	6.30	6.70
e	2.30	BASIC
e1	4.60	BASIC
E	6.70	7.30
E1	3.30	3.70
L	0.90	—

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