

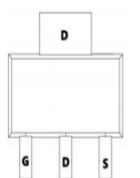
Product Summary

- V_{DS} -240 V
- I_{DS} -0.2 A
- $R_{DS(ON)}$ (at $V_{GS}=-10V$) $<12\Omega$

Application

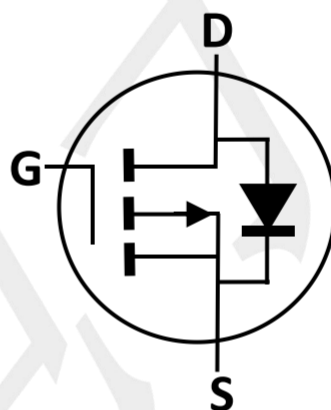
- DC/DC Converter
- Portable equipment and battery
- Active Clamp Switch

Package and Pin Configuration



SOT89-3

Circuit diagram



Equivalent Circuit

Marking: 24P

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	-240	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$ -0.2	A
		$T_C=70^\circ\text{C}$ -0.15	
Pulsed Drain Current	I_{DM}	-1	A
Total Power Dissipation	P_{DTOT}	$T_C=25^\circ\text{C}$ 1	W
Operating Junction Temperature Range	T_J	-55 to +150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$

Thermal Characteristic

PARAMETER	Symbol	Value	Unit
Junction-to-Ambient Thermal Resistance	R_{thJA}	125	$^\circ\text{C/W}$

Note : When mounted on 1" square PCB (FR4 material).

Electrical Characteristics (T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static						
Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	BV _{DSS}	-240	--	--	V
Gate-Source Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	V _{GS(th)}	-1	-1.5	-2.5	V
Gate-Source Leakage	V _{DS} =0V, V _{GS} = ±20V	I _{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V _{DS} = -240V, V _{GS} =0V	I _{DSS}	--	-0.1	-1	μA
	V _{DS} = -240V, T _J =125°C		--	-10	-100	μA
Drain-Source On-State Resistance (Note 1)	V _{GS} = -10V, I _D = -0.1A	R _{DS(on)}	--	7	12	Ω
	V _{GS} = -4.5V, I _D = -0.1A		--	8	15	
Forward Transconductance (Note 2)	V _{DS} = -10V, I _D = -0.1A	g _{fs}	--	1.5	--	S
Dynamic (Note 2)						
Total Gate Charge (Note 3)	V _{DS} = -200V, I _D = -0.2A, V _{GS} = -10V	Q _g	--	4.9	--	nC
Gate-Source Charge (Note 3)		Q _{gs}	--	0.7	--	
Gate-Drain Charge (Note 3)		Q _{gd}	--	0.8	--	
Input Capacitance	V _{DS} = -25V, V _{GS} = 0V, F= 1.0MHz	C _{iss}	--	83	--	pF
Output Capacitance		C _{oss}	--	13	--	
Reverse Transfer Capacitance		C _{rss}	--	6	--	
Switching						
Turn-On Delay Time (Note 3)	V _{DD} = -125V, I _D = -0.2A, V _{GS} = -10V, R _{GEN} = 2Ω	t _{d(on)}	--	4.7	--	nS
Rise Time (Note 3)		t _r	--	5.2	--	
Turn-Off Delay Time (Note 3)		t _{d(off)}	--	72	--	
Fall Time (Note 3)		t _f	--	50	--	
Source-Drain Diode Ratings and Characteristics (Note 2)						
Forward Voltage	V _{GS} = 0V, I _F = -0.2A	V _{SD}	--	-0.78	-1.2	V
Continuous Source Current	Integral reverse diode in the MOSFET	I _S	--	--	-0.2	A
Pulsed Current (Note 1)		I _{SM}	--	--	-0.76	A

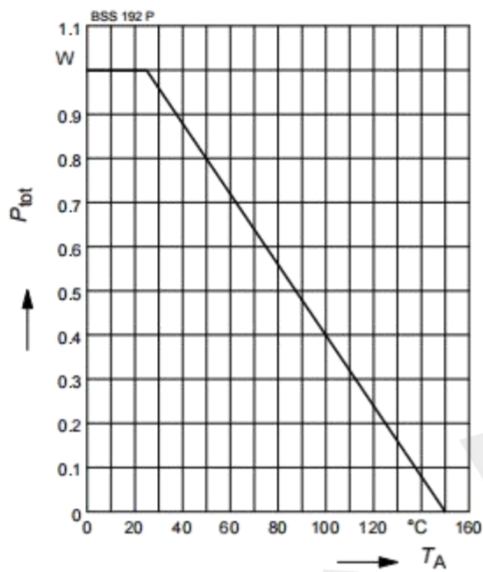
Notes:

1. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
2. Guaranteed by design, not subject to production testing.
3. Independent of operating temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

1 Power dissipation

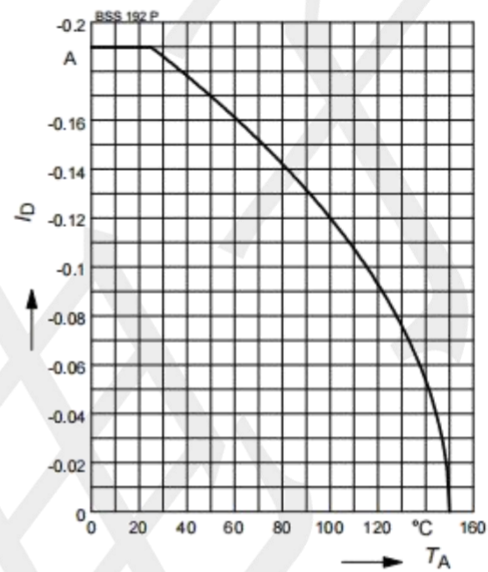
$$P_{tot} = f(T_A)$$



2 Drain current

$$I_D = f(T_A)$$

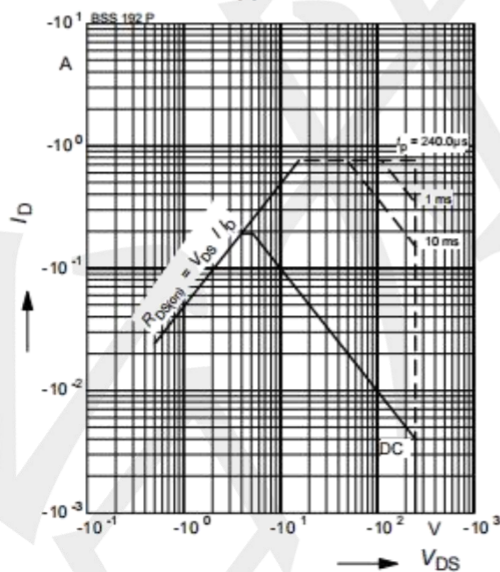
parameter: $|V_{GS}| \geq 10V$



3 Safe operating area

$$I_D = f(V_{DS})$$

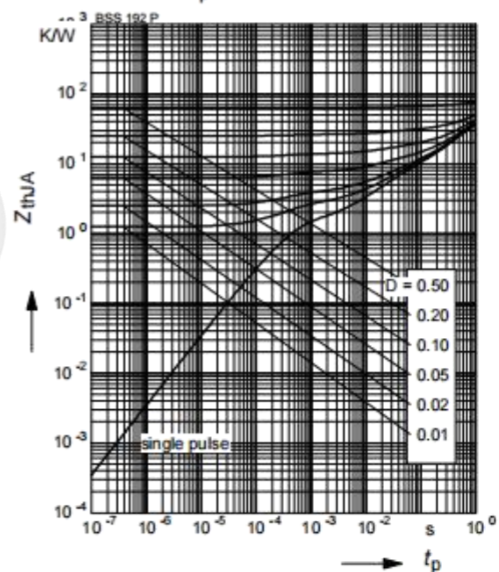
parameter: $D = 0$, $T_A = 25^\circ C$



4 Transient thermal impedance

$$Z_{thJA} = f(t_p)$$

parameter: $D = t_p / T$

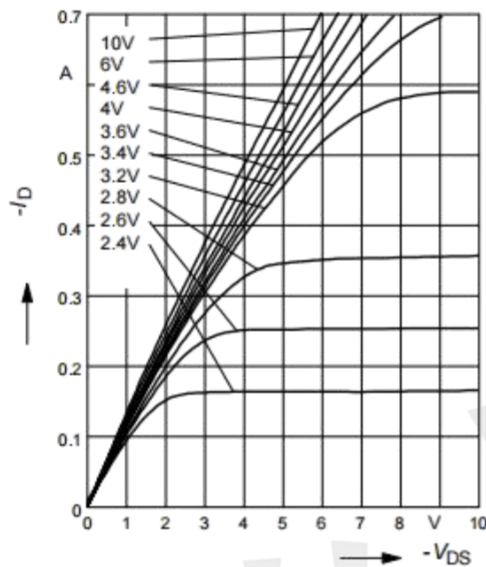


TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

5 Typ. output characteristic

$$I_D = f(V_{DS})$$

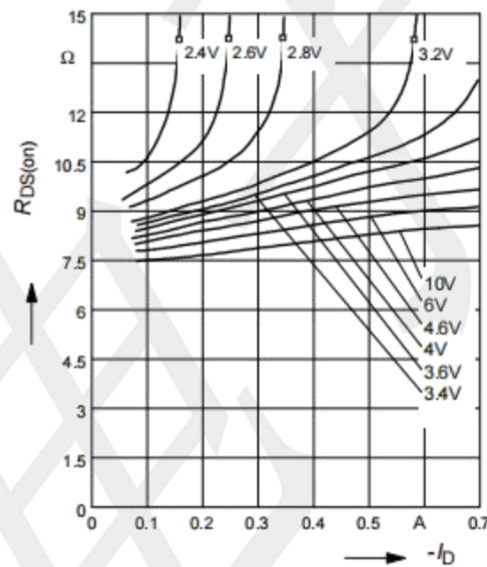
parameter: $T_j = 25^\circ\text{C}$, $-V_{GS}$



6 Typ. drain-source on resistance

$$R_{DS(on)} = f(I_D)$$

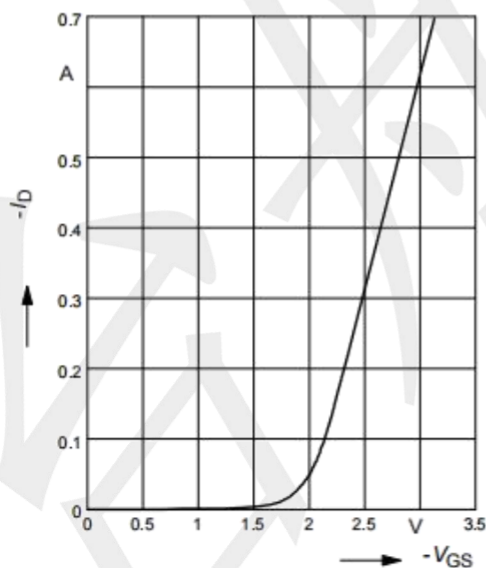
parameter: V_{GS} ; $T_j = 25^\circ\text{C}$, $-V_{GS}$



7 Typ. transfer characteristics

$$I_D = f(V_{GS}); |V_{DS}| \geq 2 \times |I_D| \times R_{DS(on)max}$$

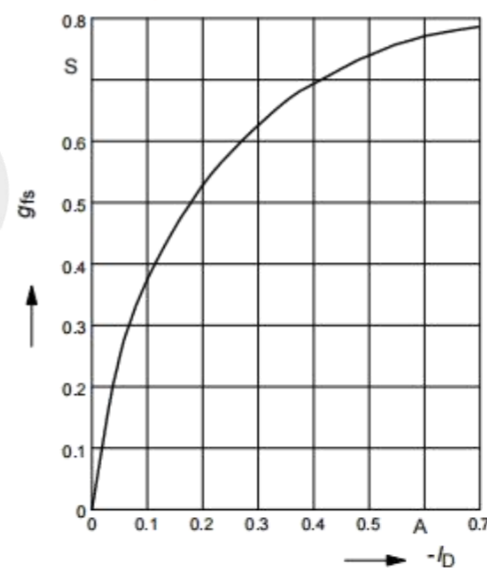
parameter: $T_j = 25^\circ\text{C}$



8 Typ. forward transconductance

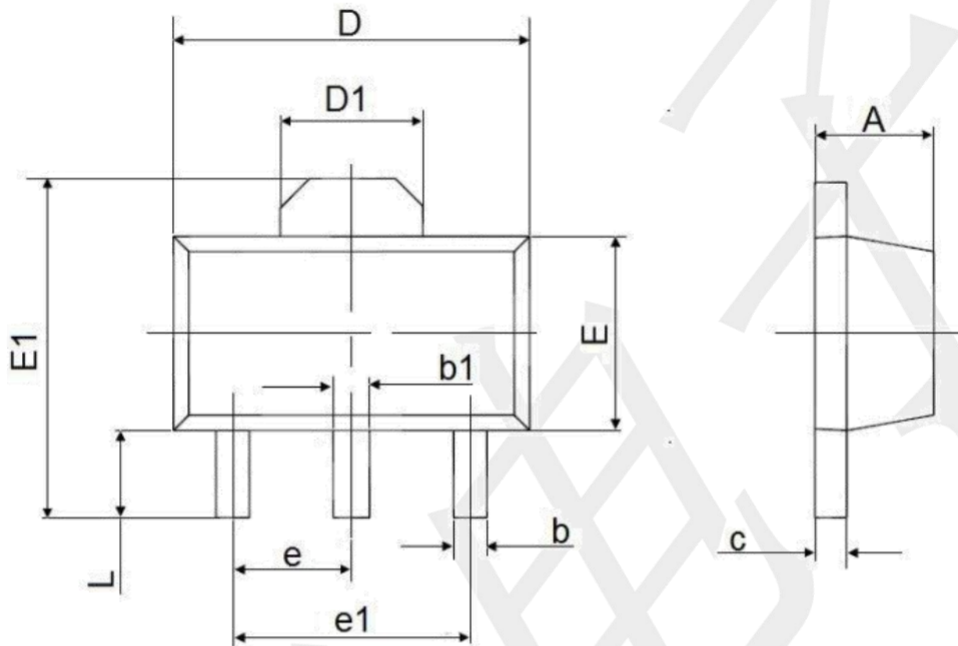
$$g_{fs} = f(I_D)$$

parameter: $T_j = 25^\circ\text{C}$



* The power dissipation PD is based on $T_J(max) = 150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

SOT89-3 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047