

Power MOSFET Wafer (N-Type 60 V)

● Features

Advanced trench cell design

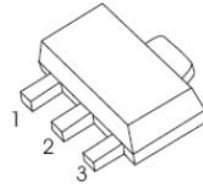
Extremely low threshold voltage

$BV \geq 60\text{ V}$ $R_{DS(ON)} \leq 75\text{ m}\Omega @ V_{GS} = 10\text{ V}$

$P_{tot} \leq 1.4\text{ W}$ $R_{DS(ON)} \leq 82\text{ m}\Omega @ V_{GS} = 5\text{ V}$

$I_D \leq 3.5\text{ A}$ $R_{DS(ON)} \leq 90\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$

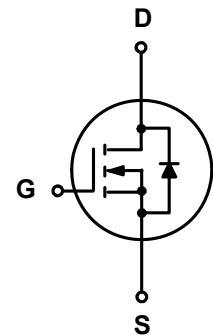
Simplified Outline



SOT-89

1. GATE 2. DRAIN 3. SOURCE

Symbol



● Applications

Portable appliances

High speed switch

Battery management

● Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	$T_A = 25\text{ }^\circ\text{C}$	60	-	V
V_{GS}	Gate-Source Voltage	$T_A = 25\text{ }^\circ\text{C}$	-	± 20	V
I_D^*	Drain Current (DC)	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$	-	3.5	A
		$T_A = 100\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$	-	2.2	A
$I_{DM}^{*,**}$	Drain Current (Pulsed)	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$	-	14	A
P_{tot}^*	Total Power Dissipation	$T_A = 25\text{ }^\circ\text{C}$	-	1.4	W
T_{stg}	Storage Temperature		- 55	150	$^\circ\text{C}$
T_J	Junction Temperature		- 55	150	$^\circ\text{C}$
I_S	Diode Forward Current	$T_A = 25\text{ }^\circ\text{C}$	-	3.5	A

Notes :

* Surface Mounted on 1 in² pad area, $t \leq 10\text{ sec}$

** Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

● Electrical Characteristics (Ta = 25 °C Unless Otherwise Noted)

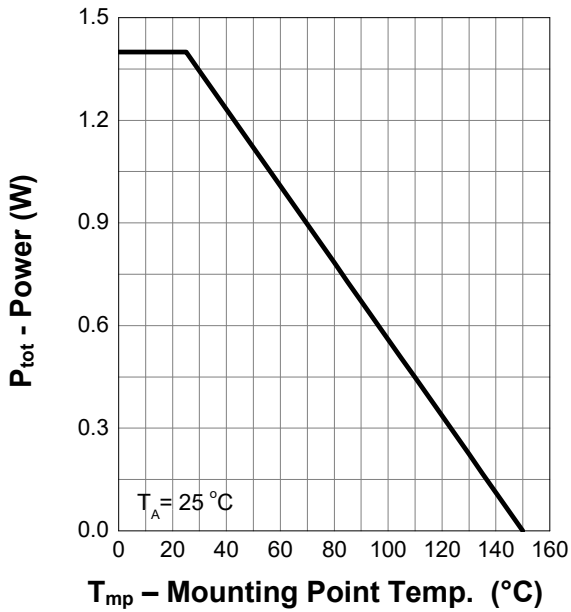
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_{DS} = 250\ \mu\text{A}$	60	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = 250\ \mu\text{A}$	1	-	2	V
I_{DSS}	Drain Leakage Current	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
I_{GSS}	Gate Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	-	-	± 100	nA
$R_{DS(on)}^a$	On-State Resistance	$V_{GS} = 10\text{ V}, I_{DS} = 2\text{ A}$	-	60.6	72.8	m Ω
		$V_{GS} = 4.5\text{ V}, I_{DS} = 1\text{ A}$	-	69.2	90	
Diode Characteristics						
V_{SD}^a	Diode Forward Voltage	$I_{SD} = 2\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.3	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 2\text{ A}, dI_{SD}/dt = 100\text{ A}/\mu\text{s}$	-	9	-	nS
Q_{rr}	Reverse Recovery Charge		-	5.1	-	nC
Dynamic Characteristics^b						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 30\text{ V}$ Frequency = 1 MHz	-	498	-	pF
C_{oss}	Output Capacitance		-	25	-	
C_{rss}	Reverse Transfer Capacitance		-	21	-	
$t_d(on)$	Turn-on Delay Time	$V_{DS} = 30\text{ V}, V_{GEN} = 10\text{ V},$ $R_G = 3.9\ \Omega, R_L = 15\ \Omega,$ $I_{DS} = 2\text{ A}$	-	4.3	-	nS
t_r	Turn-on Rise Time		-	2.7	-	
$t_d(off)$	Turn-off Delay Time		-	14	-	
t_f	Turn-off Fall Time		-	5.7	-	
Gate Charge Characteristics^b						
Q_g	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 30\text{ V},$ $I_{DS} = 2\text{ A}$	-	9.5	-	nC
Q_{gs}	Gate-Source Charge		-	2.2	-	
Q_{gd}	Gate-Drain Charge		-	1.1	-	

Notes : a : Pulse test ; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$

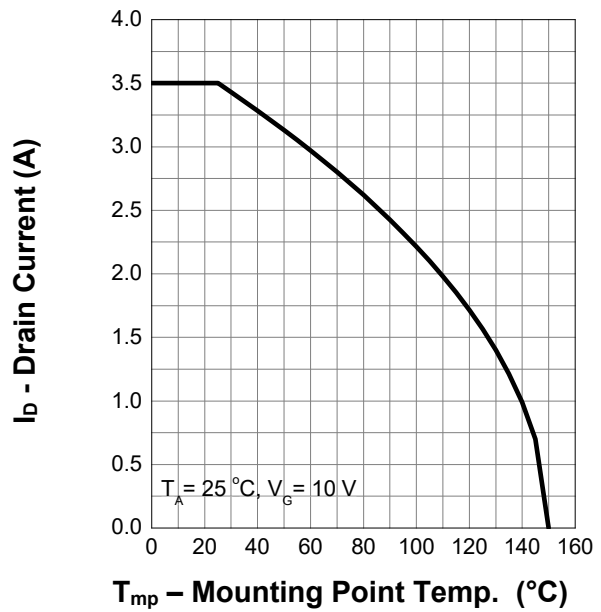
b : Guaranteed by design, not subject to production testing

Typical Characteristics

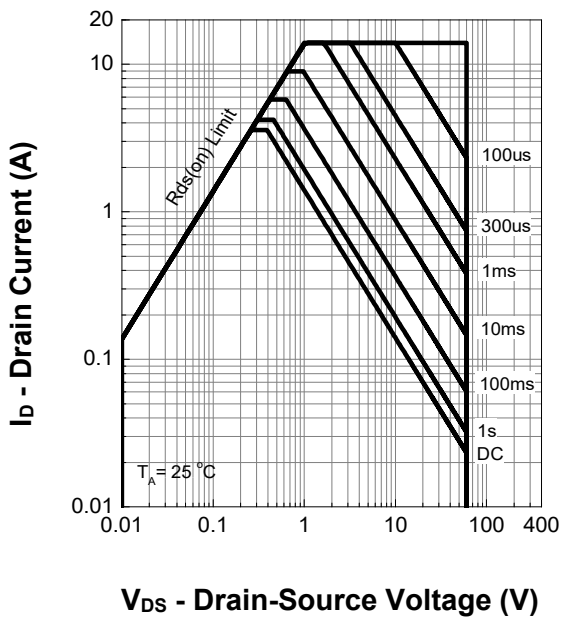
Power Capability



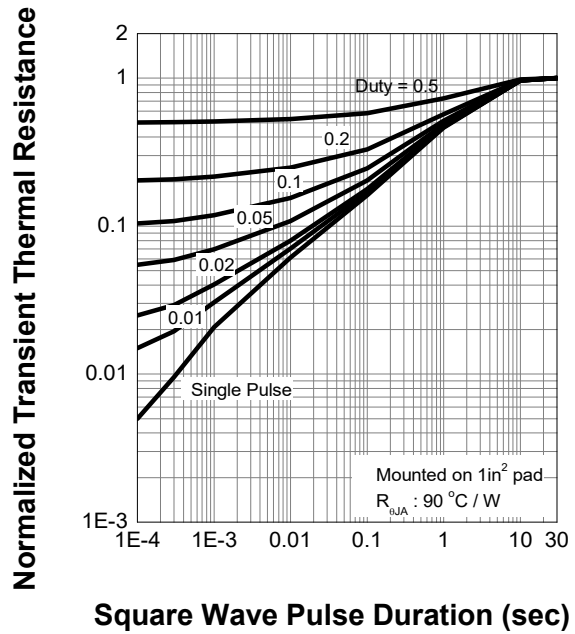
Current Capability



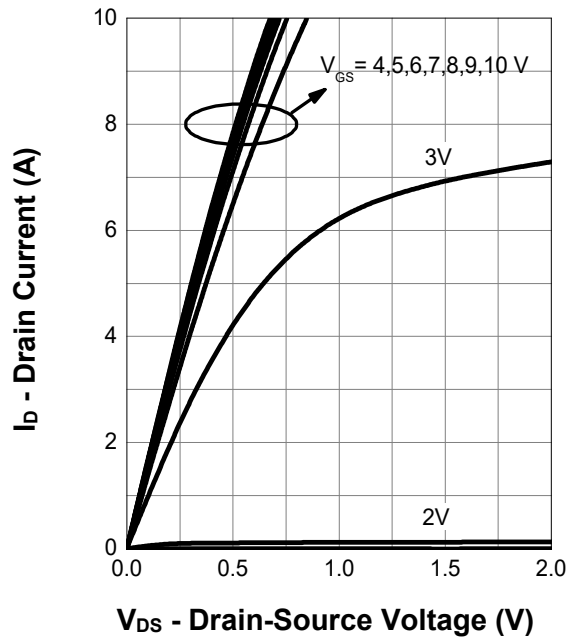
Operating



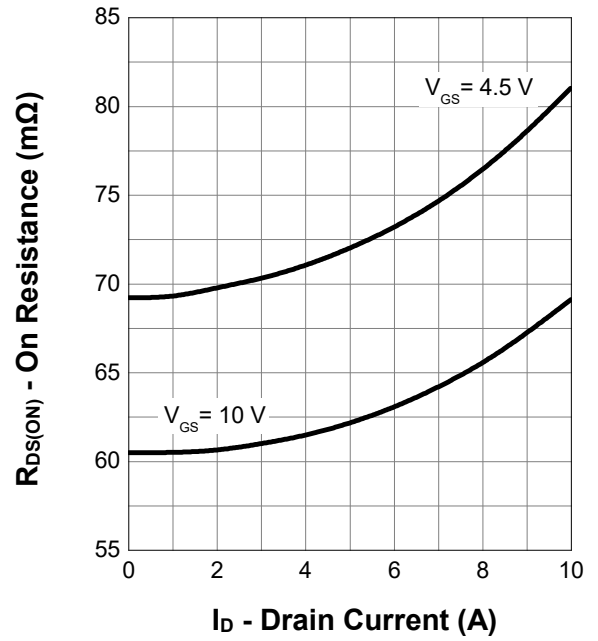
Transient Thermal Impedance



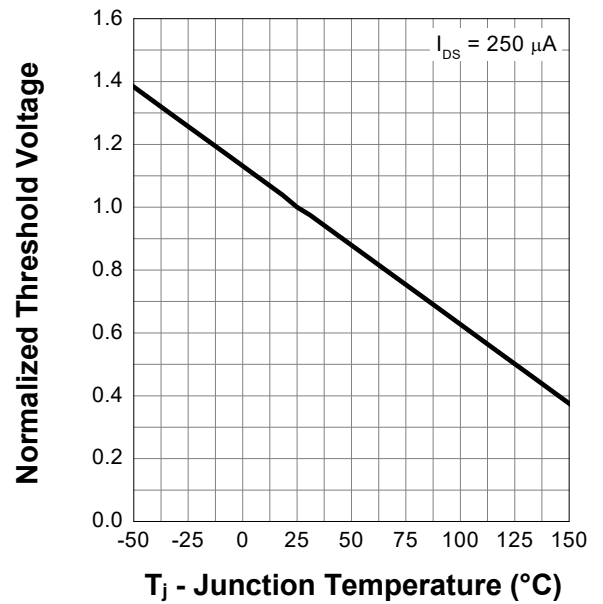
Output Characteristics

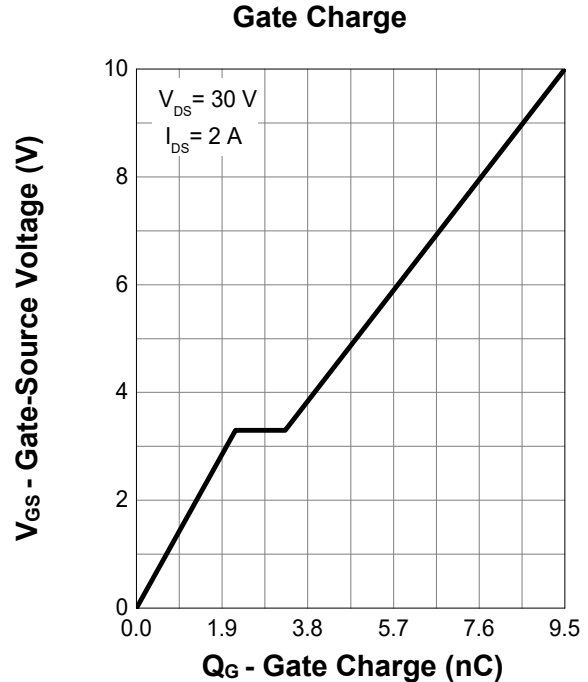
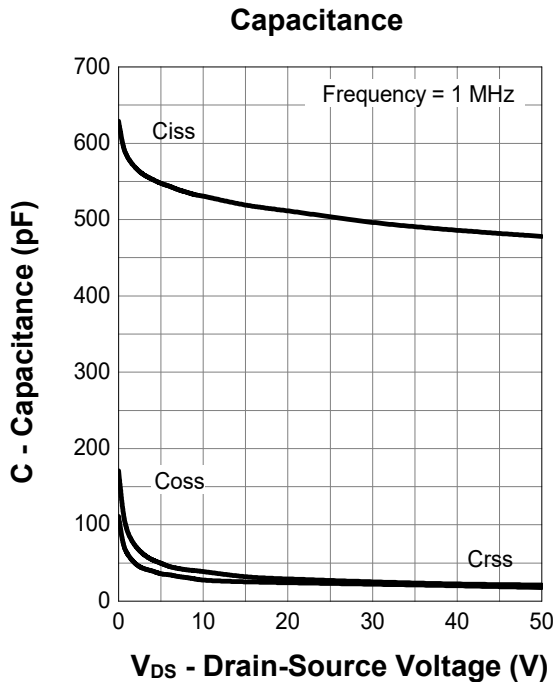
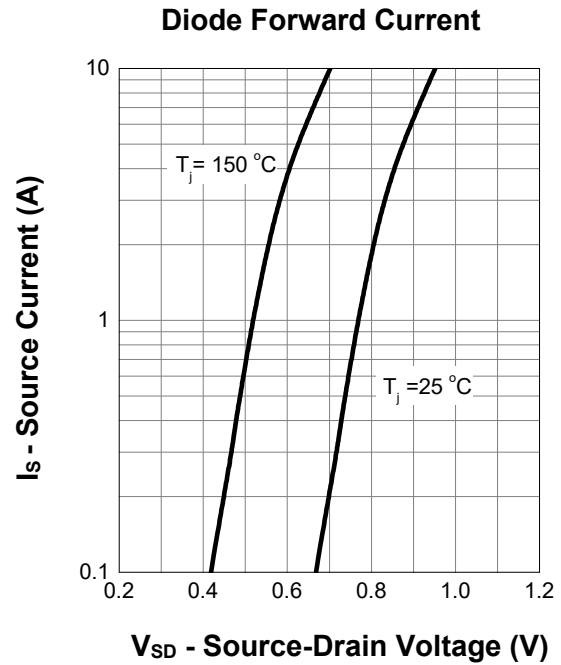
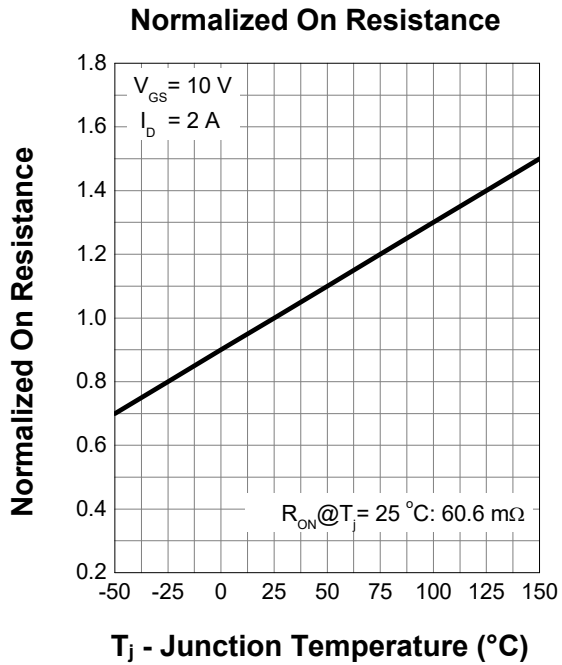


On Resistance

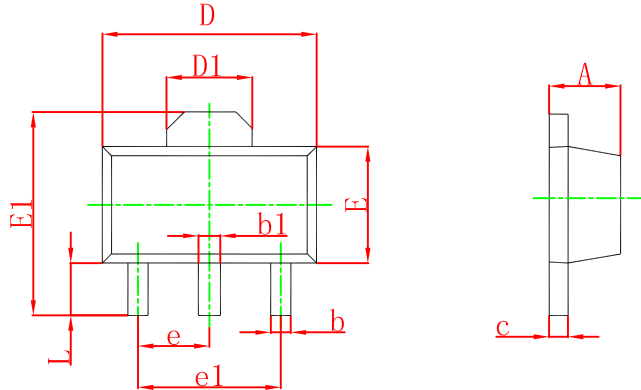


Normalized Threshold Voltage



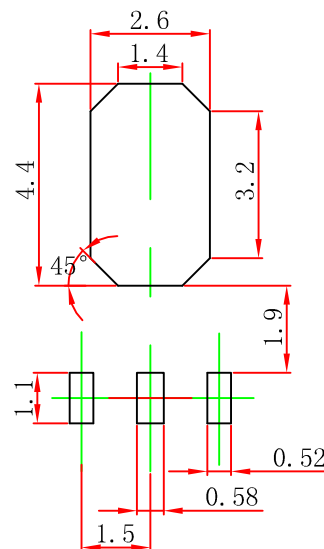


SOT-89 Package Outline Dimensions



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

SOT-89 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

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