

MI8790-VB Datasheet

N-Channel 30-V (D-S) MOSFET

V_{DS}		30	V
$R_{DS(on),typ}$	$V_{GS}=10V$	13	$m\Omega$
$R_{DS(on),typ}$	$V_{GS}=4.5V$	19	$m\Omega$
I_D		30	A

FEATURES

- Halogen-free
- Trench Power MOSFET
- 100 % R_g and UIS Tested


RoHS
 COMPLIANT

APPLICATIONS

- DC/DC Conversion
- Low-Side Switch
- Notebook PC
- Gaming

DFN 3x3 EP

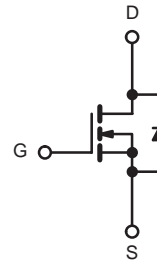
Top View



Bottom View



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	30
		$T_C = 70^\circ\text{C}$	20
		$T_A = 25^\circ\text{C}$	21.5 ^{b, c}
		$T_A = 70^\circ\text{C}$	17.1 ^{b, c}
Pulsed Drain Current	I_{DM}	100	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$	13
		$T_A = 25^\circ\text{C}$	3.1 ^{b, c}
Single Pulse Avalanche Current	I_{AS}	10	A
Avalanche Energy	E_{AS}	5	mJ
Maximum Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	60
		$T_C = 70^\circ\text{C}$	30
		$T_A = 25^\circ\text{C}$	3.7 ^{b, c}
		$T_A = 70^\circ\text{C}$	2.4 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	27	34	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Drain)	R_{thJF}	6	7.5	$^\circ\text{C/W}$

Notes:

- Based on $T_C = 25^\circ\text{C}$.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under Steady State conditions is 85°C/W .

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		27		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5.6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^{\circ}\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		13		m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$		19		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$		75		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$			900	pF
Output Capacitance	C_{oss}				236	
Reverse Transfer Capacitance	C_{rss}				20	
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$			20	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$			9	
Gate-Drain Charge	Q_{gd}				2.1	
Gate Resistance	R_g				0.7	
Turn-On Delay Time	$t_{d(on)}$	$f = 1\text{ MHz}$	0.2	1.1	2.2	Ω
Rise Time	t_r			8	16	ns
Turn-Off Delay Time	$t_{d(off)}$			16	30	
Fall Time	t_f			17	35	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong 10\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		7	15	
Rise Time	t_r			14	30	
Turn-Off Delay Time	$t_{d(off)}$			50	100	
Fall Time	t_f			16	30	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			13	A
Pulse Diode Forward Current ^a	I_{SM}				100	
Body Diode Voltage	V_{SD}	$I_S = 3\text{ A}$			1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 10\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^{\circ}\text{C}$			40	ns
Body Diode Reverse Recovery Charge	Q_{rr}				20	nC
Reverse Recovery Fall Time	t_a			12.5		ns
Reverse Recovery Rise Time	t_b			7.5		

Notes:

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

b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Output Characteristics

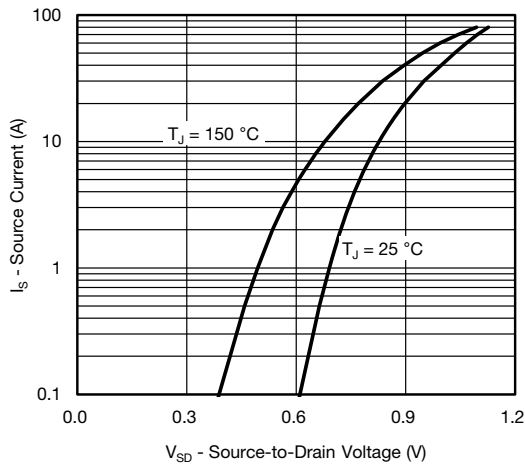
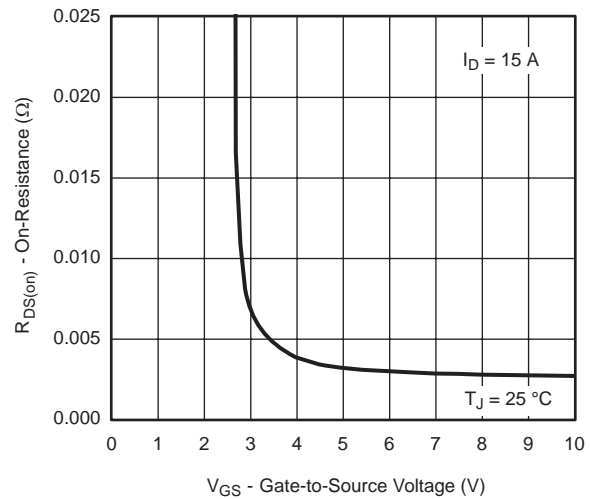
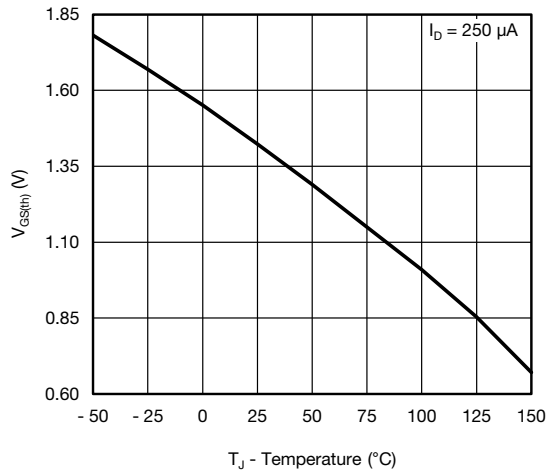
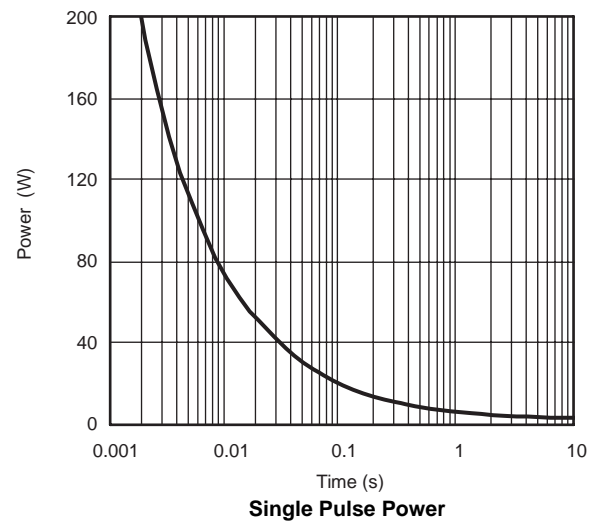
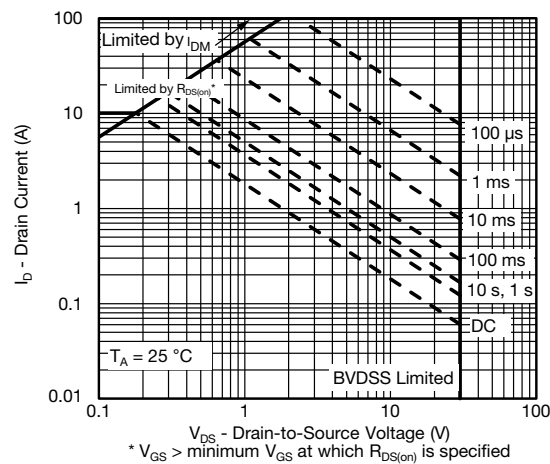
Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

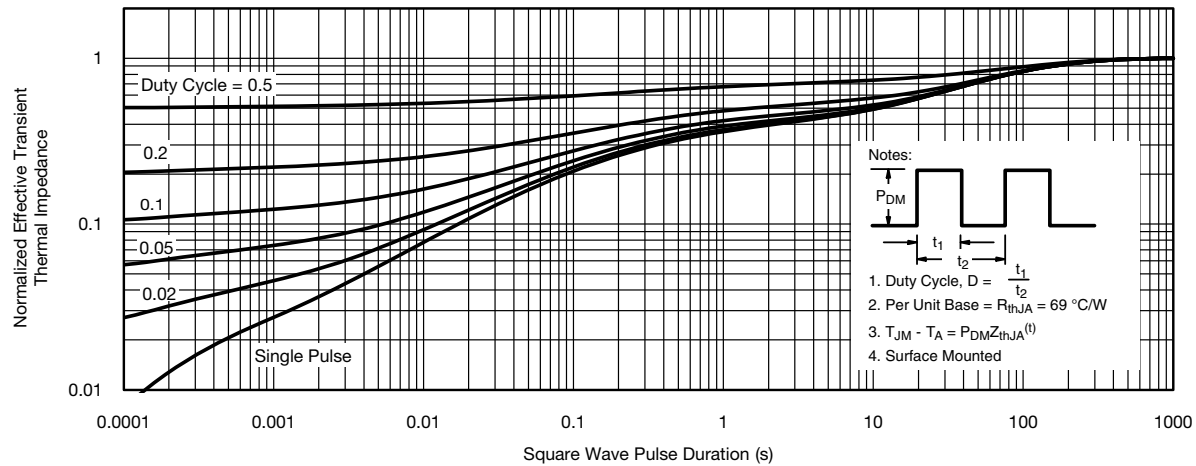
Gate Charge

On-Resistance vs. Junction Temperature

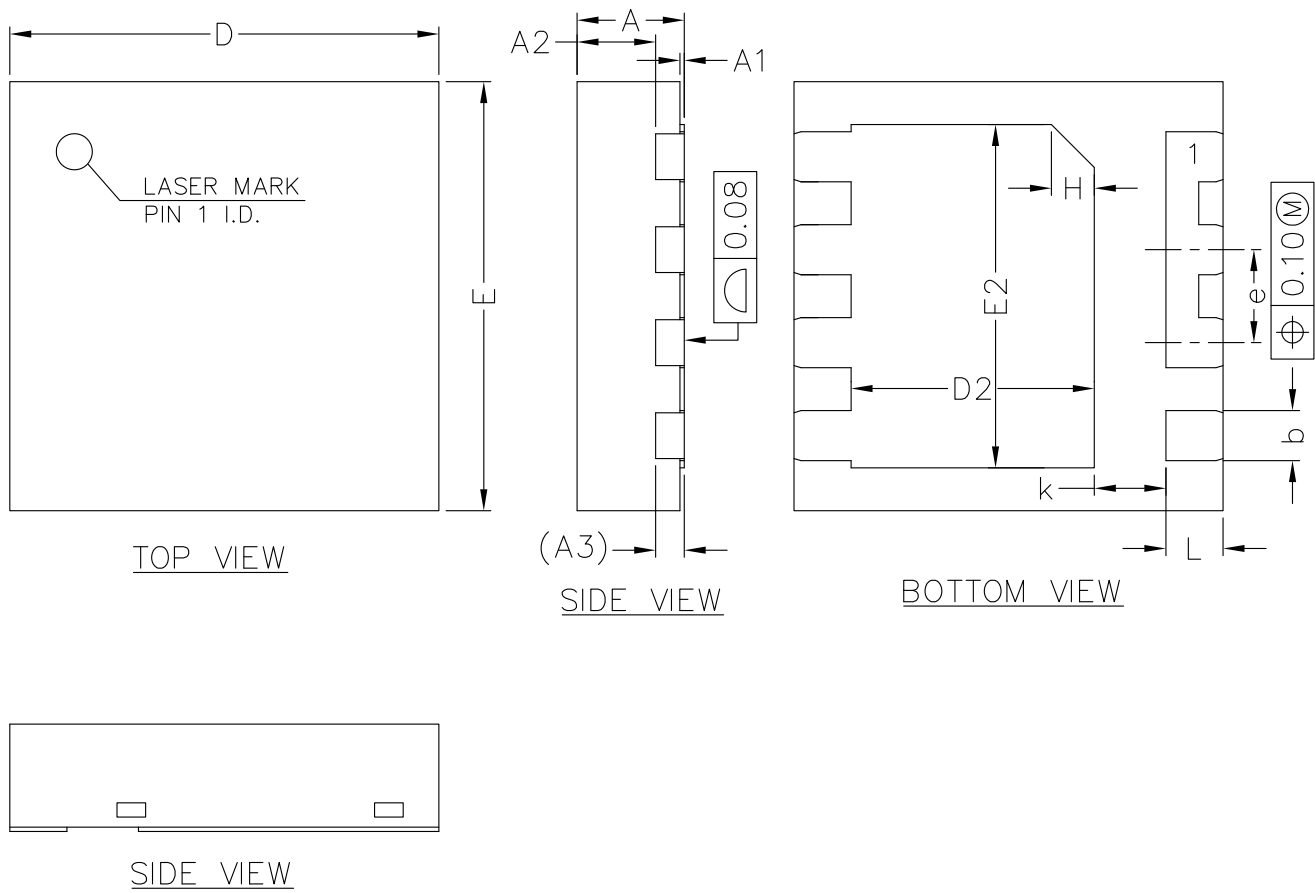
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Single Pulse Power

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Note**

- a. The power dissipation P_D is based on $T_J \text{ max.} = 25 \text{ °C}$, 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.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.50	0.55	0.60
A3	0.20REF		
b	0.30	0.35	0.40
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	1.60	1.70	1.80
E2	2.30	2.40	2.50
e	0.55	0.65	0.75
K	0.40	0.50	0.60
L	0.35	0.40	0.45

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