

IMW120R090M1H-VB Datasheet

N-Channel 1200V (D-S) SiC Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	1200	
$R_{DS(on)}$ at 25 °C (Ω)	$V_{GS} = 18$ V	0.080
Q_g (nC)	110	

FEATURES

- Low figure-of-merit (FOM) $R_{on} \times Q_g$
- Low input capacitance (C_{iss})
- Reduced switching and conduction losses
- Ultra low gate charge (Q_g)
- Avalanche energy rated (UIS)

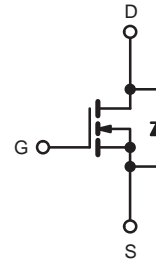


APPLICATIONS

- Server and telecom power supplies
- Switch mode power supplies (SMPS)
- Power factor correction power supplies (PFC)
- DC/DC converter



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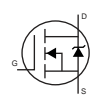
N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	V_{DS}	1200	V	
Gate-Source Voltage	V_{GS}	-10 / +22		
Continuous Drain Current ($T_J = 150$ °C)	V_{GS} at 18 V	$T_C = 25$ °C	30	A
		$T_C = 100$ °C	21	
Pulsed Drain Current ^a		I_{DM}	90	
Linear Derating Factor			2.1	W/°C
Single Pulse Avalanche Energy ^b		E_{AS}	1200	mJ
Maximum Power Dissipation		P_D	320	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	°C
Drain-Source Voltage Slope	$T_J = 125$ °C	dV/dt	50	V/ns
Reverse Diode dV/dt ^d			15	
Soldering Recommendations (Peak Temperature) ^c	for 10 s		260	°C

Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 100$ V, starting $T_J = 25$ °C, $L = 30$ mH, $R_g = 25$ Ω , $I_{AS} = 9$ A.
- 1.6 mm from case.
- $I_{SD} \leq I_D$, $dI/dt = 100$ A/ μ s, starting $T_J = 25$ °C.

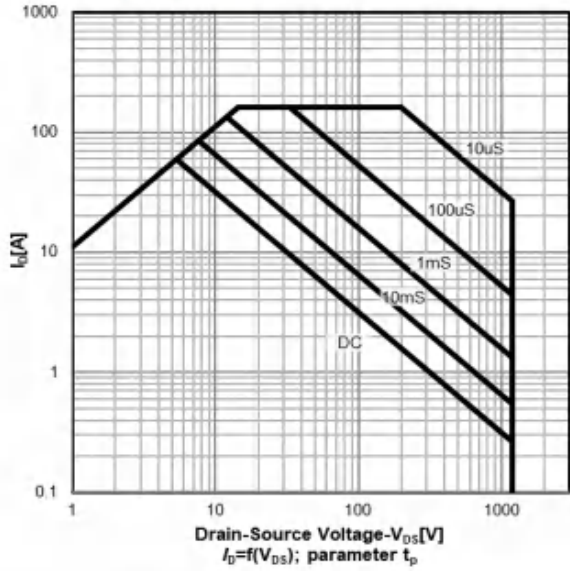
THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	40	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.47	

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}	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$		1200	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}$		-	0.70	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 10\text{ mA}$		2.5	-	4.5	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = +22\text{ V}$		-	-	100	nA
		$V_{GS} = -10\text{ V}$		-	-	100	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}$		-	10	-	μA
		$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$		-	-	100	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 18\text{ V}$	$I_D = 30\text{ A}$	-	0.080	-	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 0\text{ V}, I_D = 30\text{ A}$		-	16	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V},$ $V_{DS} = 800\text{ V},$ $f = 1\text{ MHz}$		-	3000	-	pF
Output Capacitance	C_{oss}			-	123	-	
Reverse Transfer Capacitance	C_{rss}			-	10	-	
Effective Output Capacitance, Energy Related ^a	$C_{o(er)}$	$V_{DS} = 0\text{ V to } 800\text{ V}, V_{GS} = 0\text{ V}$		-	156	-	
Effective Output Capacitance, Time Related ^b	$C_{o(tr)}$			-	268	-	
Total Gate Charge	Q_g	$V_{GS} = -5/18\text{ V}$	$I_D = 20\text{ A}, V_{DS} = 800\text{ V}$	-	101	-	nC
Gate-Source Charge	Q_{gs}			-	29	-	
Gate-Drain Charge	Q_{gd}			-	33	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 800\text{ V}, I_D = 20\text{ A},$ $V_{GS} = -5/18\text{ V}, R_g = 2\text{ }\Omega$		-	18	25	ns
Rise Time	t_r			-	24	55	
Turn-Off Delay Time	$t_{d(off)}$			-	80	-	
Fall Time	t_f			-	12	-	
Gate Input Resistance	R_g	$f = 1\text{ MHz}, \text{ open drain}$		-	3.2	-	Ω
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	30	A
Pulsed Diode Forward Current	I_{SM}			-	-	90	
Diode Forward Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = 30\text{ A}, V_{GS} = 0$		-	-	4.1	V
Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 30\text{ A},$ $di/dt = 1000\text{ A}/\mu\text{s}, V_R = 800\text{ V}$		-	75	-	ns
Reverse Recovery Charge	Q_{rr}			-	220	-	μC
Reverse Recovery Current	I_{RRM}			-	60	-	A

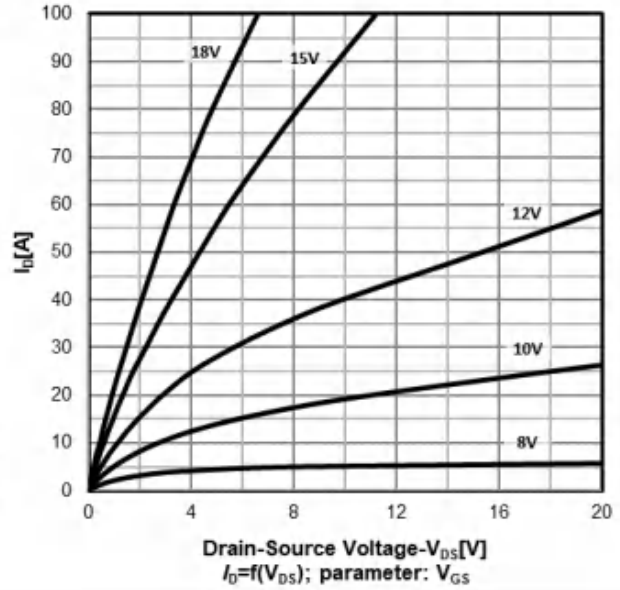
Notes

- a. $C_{oss(er)}$ is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .
- b. $C_{oss(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .

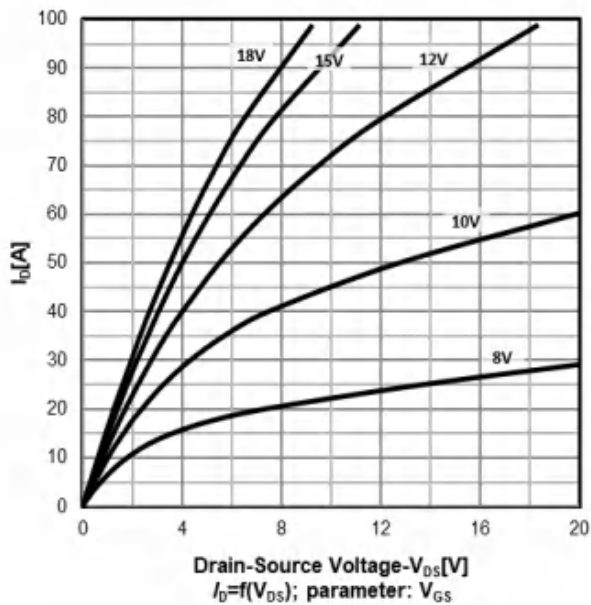
Safe operating area Tc=25 °C
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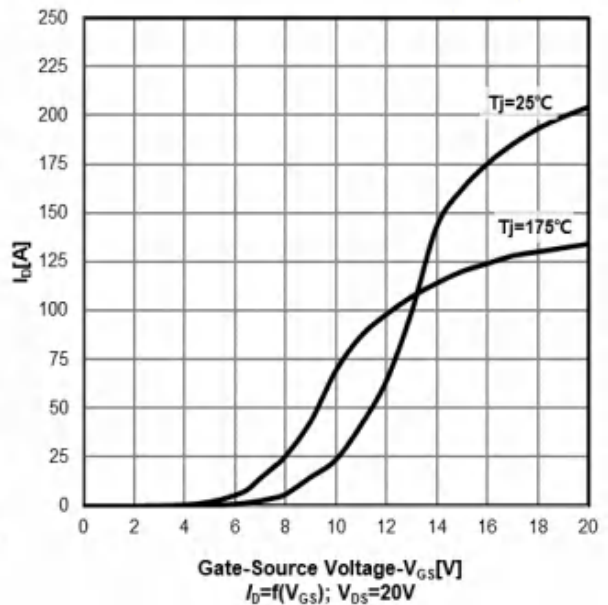
On-Region characteristics Tj=25 °C



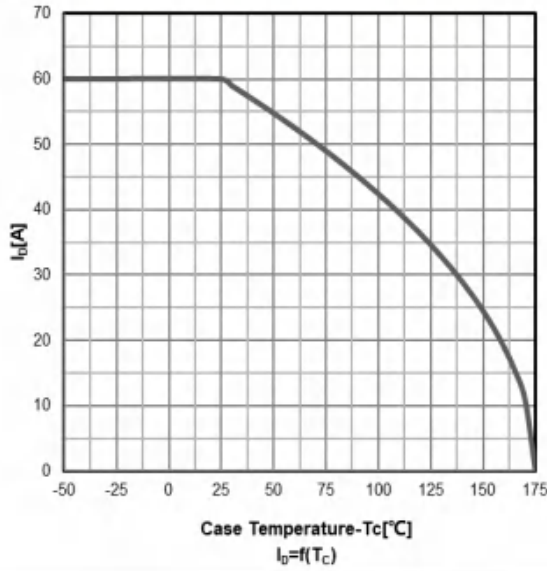
On-Region characteristics Tj=175 °C



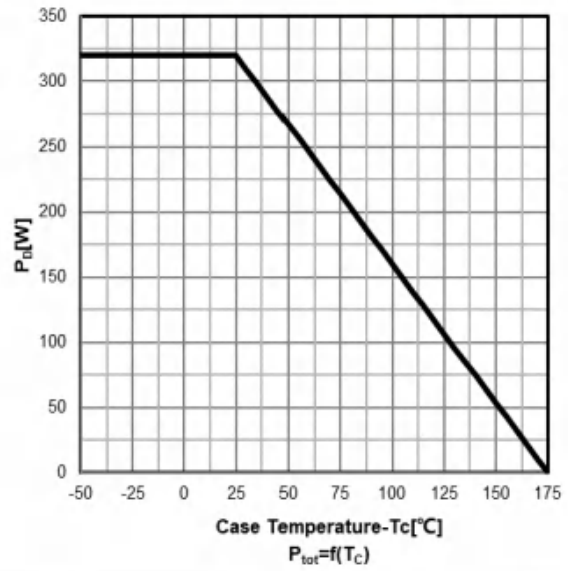
Transfer characteristics



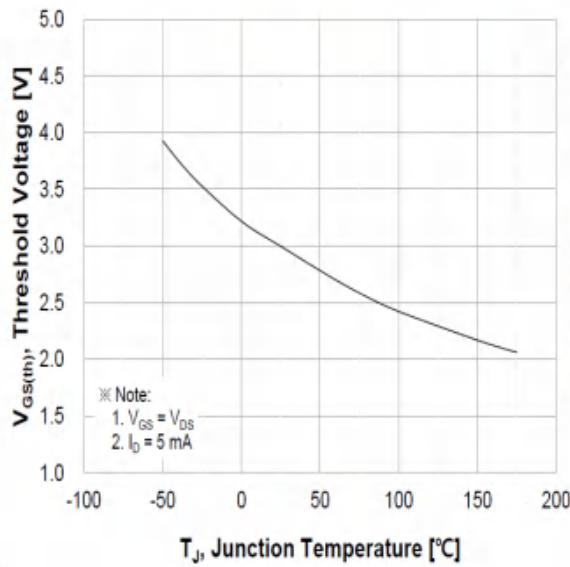
Drain current vs temperature



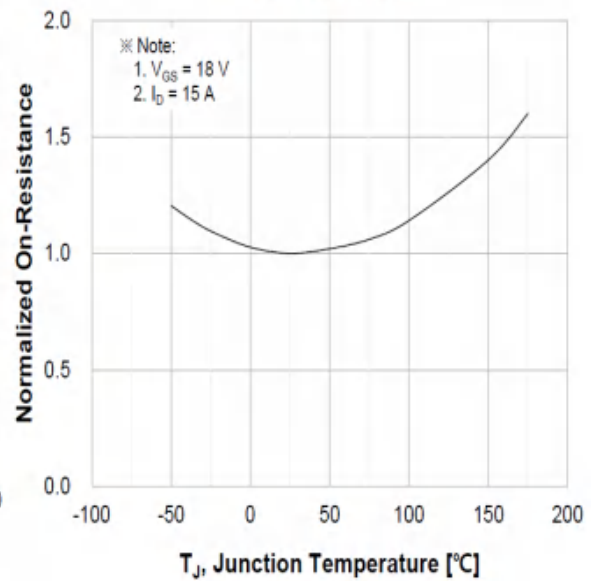
Power dissipation



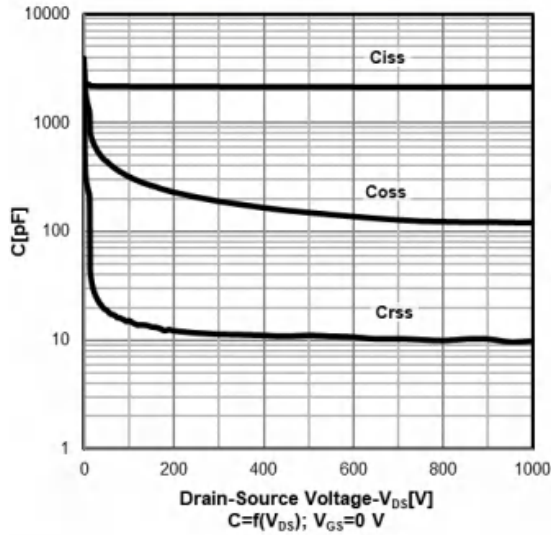
Threshold voltage vs temperature



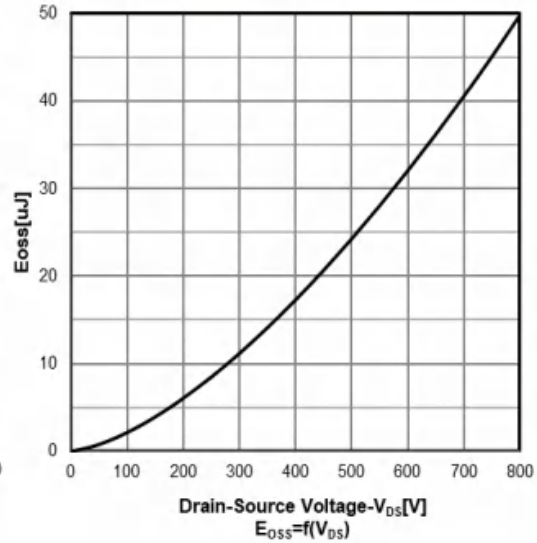
Normalized On-resistance vs temperature



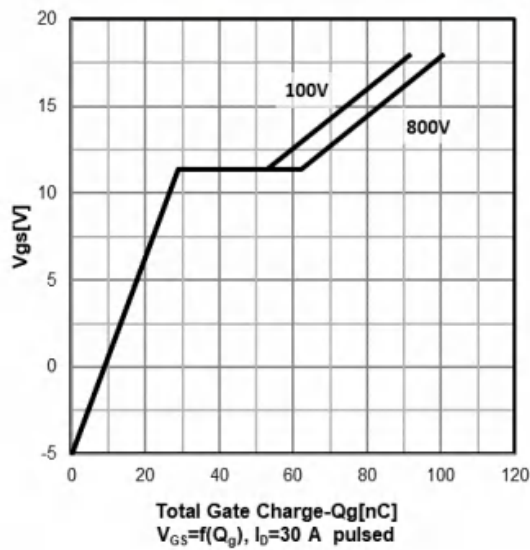
Typ. capacitances



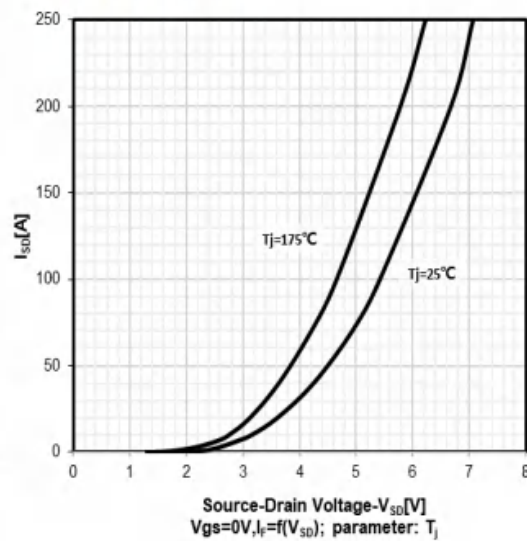
C_{oss} stored energy



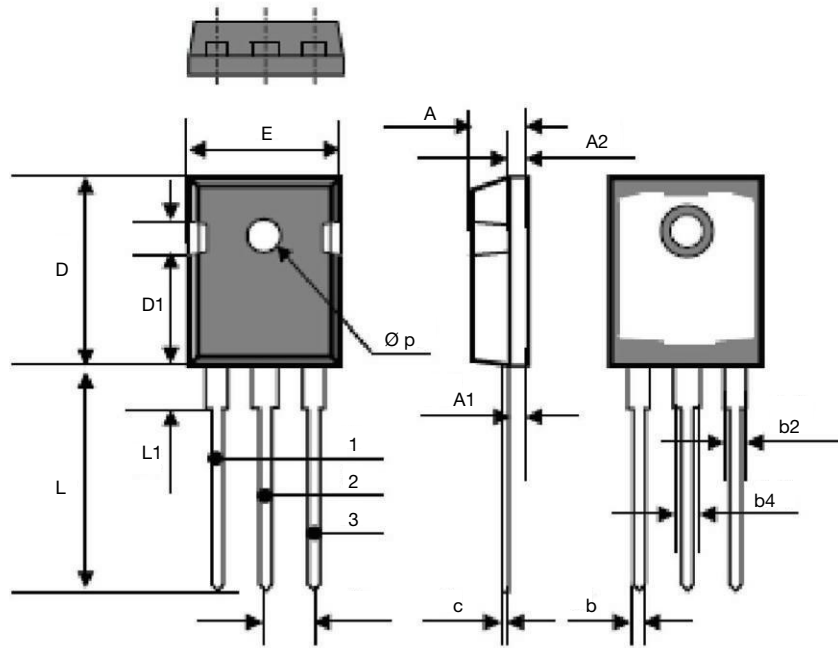
Typ. gate charge characteristics



Diode forward voltage characteristics
 $T_j=25^\circ C/175^\circ C$



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DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.70	5.31	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.41	0.065	0.095
b4	2.59	3.43	0.102	0.135
c	0.61 BSC		0.024 BSC	
D	20.80	21.46	0.819	0.845
D1	3.68	5.49	0.145	0.216
(e)	5.46 BSC		0.215 BSC	
E	15.49	16.26	0.610	0.640
L	19.81	20.32	0.780	0.800
L1	4.06	4.50	0.160	0.177
$\varnothing p$	3.51	3.66	0.138	0.144

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