

1. General description

W3MS40N009V is a low voltage N-channel MOSFET in PDFN5*6 package, which utilizes the split gate technology to provide superior FOM $R_{DS(on)} * Q_g$ among silicon based MOSFETs. It is particularly suitable for applications require extreme high efficiency and power density.



2. Features and benefits

- High-speed switching
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- 100% avalanche tested
- Qualified according to JEDEC criteria

3. Applications

- High-Efficiency DC-DC Converters
- High-Frequency Switching and Synchronous Rectification
- Motor Drivers

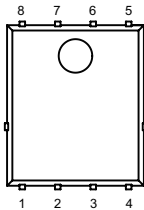
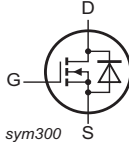
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V _{DS}	drain-source voltage			40			V
V _{GS}	gate-source voltage	static		±20			V
I _D	continuous drain current	T _C = 25 °C		330			A
P _{tot}	power dissipation	T _C = 25 °C		160			W
T _j	junction temperature			-55 to 175			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
R _{DS(on)}	drain-source on-state resistance	V _{GS} = 10 V, I _D = 20 A		-	0.7	0.9	mΩ
Dynamic characteristics							
Q _{G(tot)}	total gate charge	I _D = 20 A; V _{DS} = 20 V; V _{GS} = 10 V		-	77	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1-3	S	source		
4	G	gate		
5-8	D	drain		

6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
W3MS40N009V	PDFN5X6	W3MS40N009VJ	Reel	5000	PDFN5X6O	11-Feb-2026

7. Marking

Table 4. Marking codes

Type number	Marking codes
W3MS40N009V	W3MS 40N009V

8. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DS}	drain-source voltage			40	V
V_{GS}	gate-source voltage	static		± 20	V
I_D	continuous drain current	$T_C = 25\text{ }^{\circ}\text{C}$		330	A
		$T_C = 100\text{ }^{\circ}\text{C}$		232	A
I_{DM}	pulsed drain current	$T_C = 25\text{ }^{\circ}\text{C}$		1200	A
P_{tot}	power dissipation	$T_C = 25\text{ }^{\circ}\text{C}$		160	W
E_{AS}	single pulse drain-to-source avalanche	$I_{AS} = 28\text{ A}$; $R_{GS} = 25\text{ }\Omega$; $V_{DD} = 50\text{ V}$; $T_J = 25\text{ }^{\circ}\text{C}$		392	mJ
I_{AS}	avalanche current, single pulse			28	A
T_{stg}	storage temperature			-55 to 175	$^{\circ}\text{C}$
T_J	junction temperature			-55 to 175	$^{\circ}\text{C}$

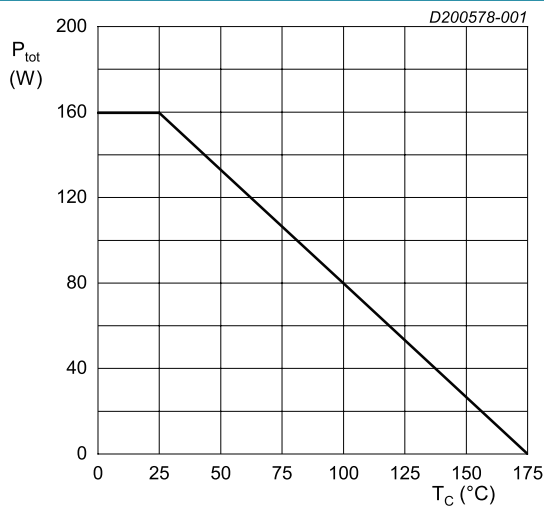


Fig. 1. Total power dissipation as a function of case temperature

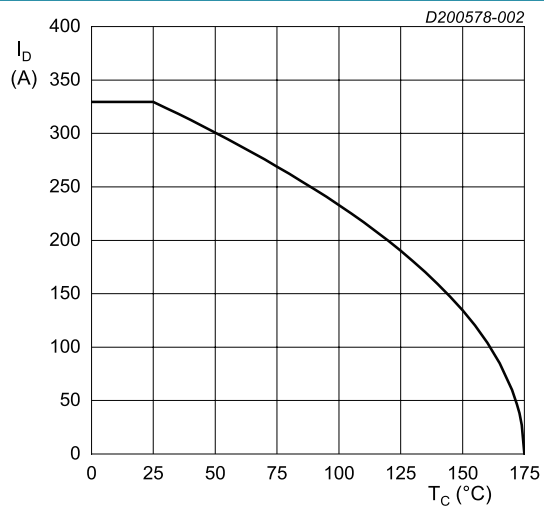
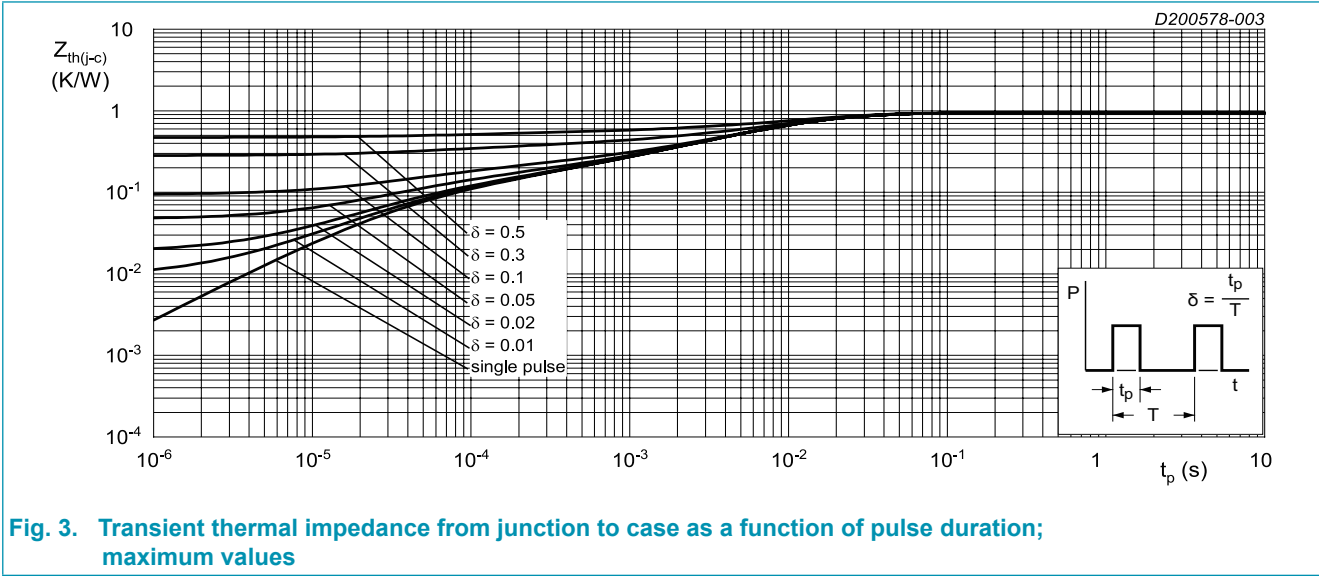


Fig. 2. Continuous Drain Current as a function of case temperature

9. Thermal & Mechanical characteristics

Table 6. Thermal & Mechanical characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case			-	-	0.94	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	-	50	K/W



10. Characteristics

Table 7. Characteristics
 $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 250 μA; V _{GS} = 0 V		40	-	-	V
V _{GS(th)}	gate-source threshold voltage	I _D = 250 μA; V _{DS} = V _{GS}		2.0	3.0	4.0	V
I _{DSS}	drain leakage current	V _{DS} = 40 V; V _{GS} = 0 V		-	-	1	μA
		V _{DS} = 40 V; V _{GS} = 0 V; T _j = 125 °C		-	-	100	μA
I _{GSS}	gate leakage current	V _{GS} = ±20 V; V _{DS} = 0 V		-	-	±100	nA
R _{DS(on)}	drain-source on-state resistance	V _{GS} = 10 V; I _D = 20 A		-	0.7	0.9	mΩ
R _G	gate resistance	f = 1 MHz		-	2.0	-	Ω
g _{fs}	transconductance	V _{DS} = 5 V; I _D = 20 A; T _j = 25 °C		-	60	-	S
Dynamic characteristics							
Q _{G(tot)}	total gate charge	I _D = 20 A; V _{DS} = 20 V; V _{GS} = 10 V		-	77	-	nC
Q _{GS}	gate-source charge			-	24	-	nC
Q _{GD}	gate-drain charge			-	15	-	nC
C _{iss}	input capacitance	V _{DS} = 20 V; V _{GS} = 0 V; f = 1 MHz		-	5289	-	pF
C _{oss}	output capacitance			-	2929	-	pF
C _{rss}	reverse transfer capacitance			-	84	-	pF
t _{d(on)}	turn-on delay time	V _{DS} = 20 V; V _{GS} = 10 V; R _G = 3 Ω; I _D = 20 A		-	15	-	ns
t _r	rise time			-	25	-	ns
t _{d(off)}	turn-off delay time			-	45	-	ns
t _f	fall time			-	22	-	ns
Source-drain diode							
V _{SD}	source-drain voltage	V _{GS} = 0 V; I _S = 20 A		-	0.7	1.2	V
I _S	body-diode continuous current	T _C = 25 °C		-	-	330	A
t _{rr}	reverse recovery time	V _R = 20 V; I _F = 20 A; dI _F /dt = 100 A/μs		-	65	-	ns
Q _{rr}	reverse recovered charge			-	104	-	nC

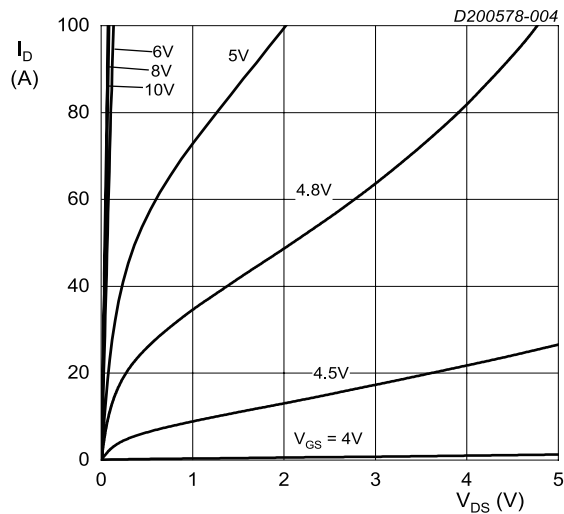


Fig. 4. Drain current as a function of drain-source voltage; typical values

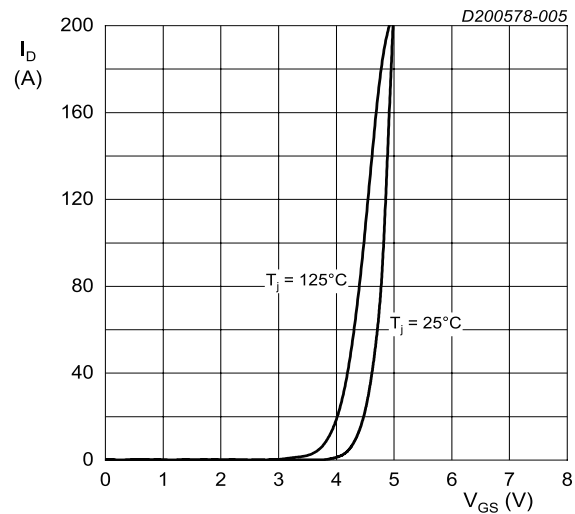


Fig. 5. Drain current as a function of gate-source voltage; typical values

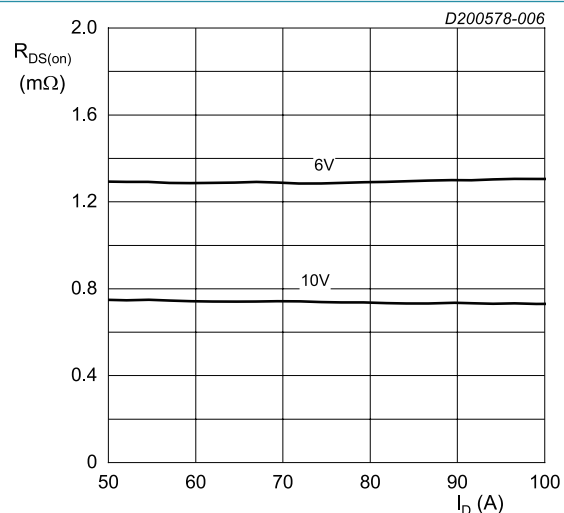


Fig. 6. Drain-source on-state resistance as a function of drain current; typical values

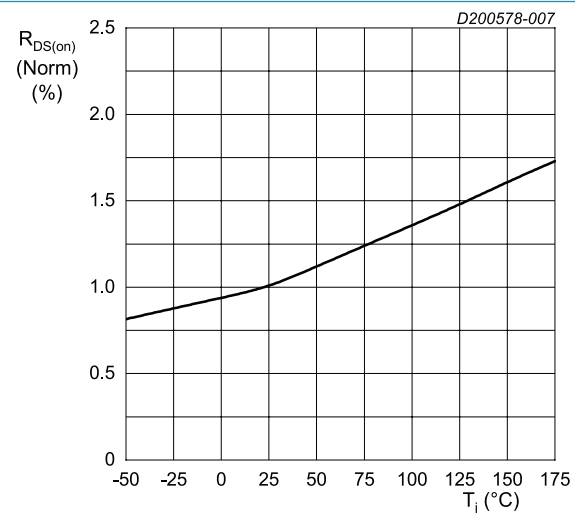
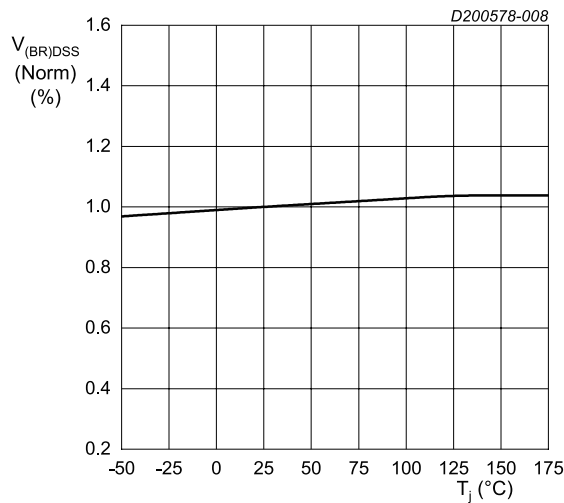
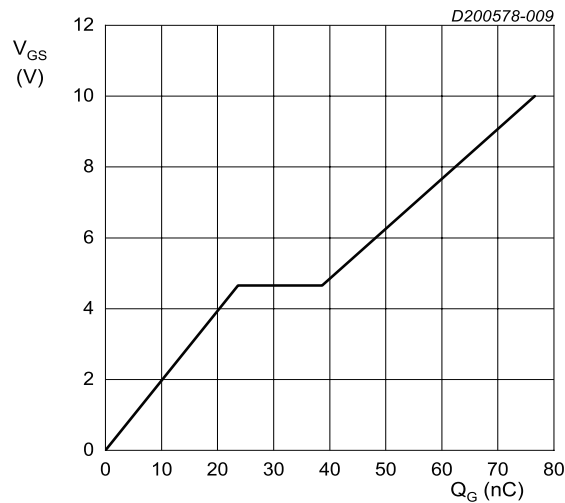


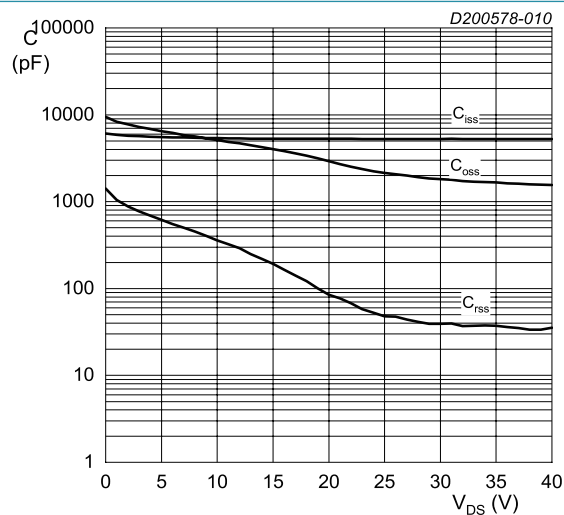
Fig. 7. Normalized drain-source on-state resistance as a function of junction temperature



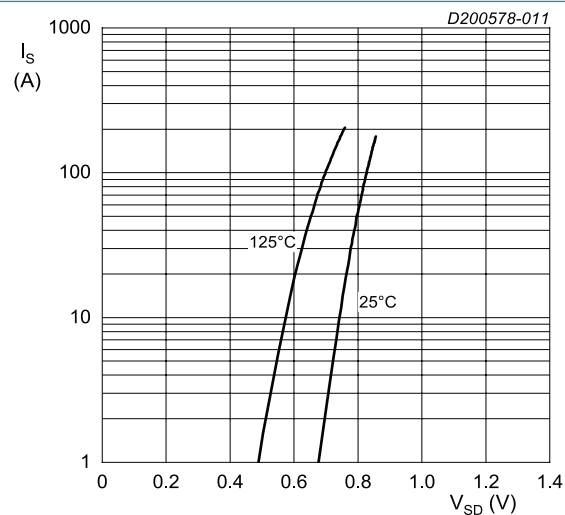
$I_D = 1\text{ mA}$
Fig. 8. Normalized drain-source breakdown voltage as a function of junction temperature



$I_D = 20\text{ A}; V_{DS} = 20\text{ V}$
Fig. 9. Gate-source voltage as a function of gate charge; typical values



$V_{GS} = 0\text{ V}; f = 250\text{ kHz}$
Fig 10. Capacitances as a function of drain-source voltage; typical values



$V_{GS} = 0\text{ V}$
Fig 11. Source current as a function of source-drain voltage; typical values

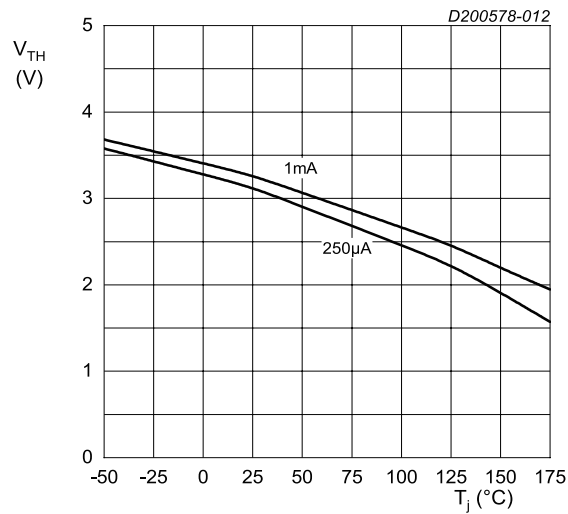
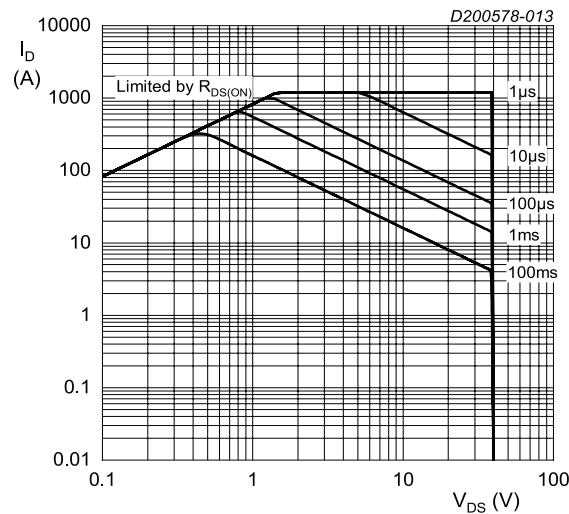
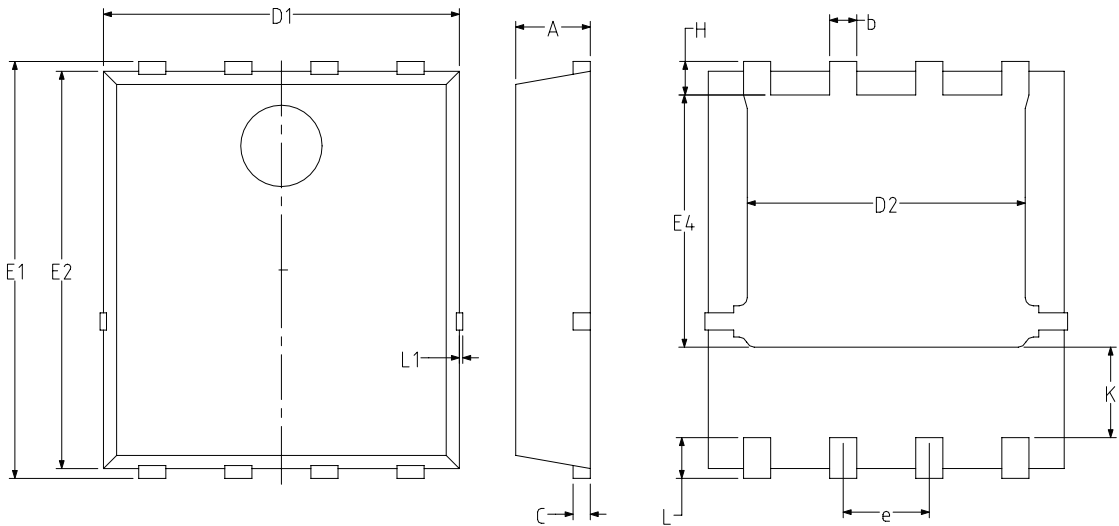


Fig. 12. Gate threshold voltage as a function of junction temperature



$T_C = 25\text{ }^{\circ}\text{C}$
Fig. 13. Safe operating area

11. Package outline



SYMBOL	MM		
	MIN	NOM	MAX
A	1.000	1.100	1.200
b	0.390	0.400	0.410
C	0.154	0.254	0.354
D1	5.050	5.250	5.450
D2	3.800	4.100	4.250
E1	5.950	6.150	6.350
E2	5.660	5.860	6.060
E4	3.520	3.720	3.920
e	1.170	1.270	1.370
H	0.400	0.500	0.600
K	1.340 REF		
L	0.300	0.600	0.700
L1	0.010	—	0.120

Note:
1. All dimensions don't include mold flash and metal protrusion.

12. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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