

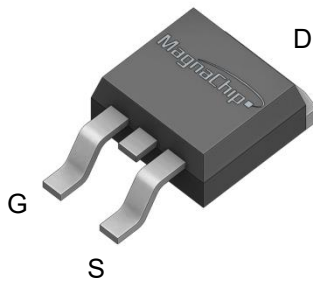
### General Description

The MDE1991 uses advanced MagnaChip's MV MOSFET Technology, which provides high performance in on-state resistance, fast switching performance, and excellent quality.

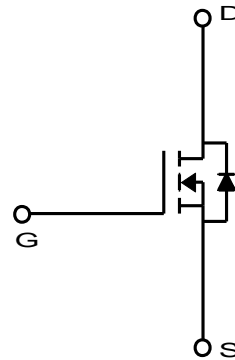
These devices can also be utilized in industrial applications such as Low Power Drives of E-bike (E-Vehicles), DC/DC converter, and general purpose applications.

### Features

- $V_{DS} = 100V$
- $I_D = 120A @ V_{GS} = 10V$
- Very low on-resistance  $R_{DS(ON)} < 4.4 m\Omega @ V_{GS} = 10V$
- 100% UIL Tested



**TO-263**



### Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		$V_{DSS}$	100	V
Gate-Source Voltage		$V_{GSS}$	±20	V
Continuous Drain Current <sup>(1)</sup>	$T_C=25^\circ C$ (Silicon Limited)	$I_D$	159	A
	$T_C=25^\circ C$ (Package Limited)		120	
	$T_C=100^\circ C$		100	
Pulsed Drain Current <sup>(3)</sup>		$I_{DM}$	480	
Power Dissipation	$T_C=25^\circ C$	$P_D$	223	W
	$T_C=100^\circ C$		89	
Single Pulse Avalanche Energy <sup>(2)</sup>		$E_{AS}$	392	mJ
Junction and Storage Temperature Range		$T_J, T_{stg}$	-55~150	°C

### Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient <sup>(1)</sup>	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.56	

## Ordering Information

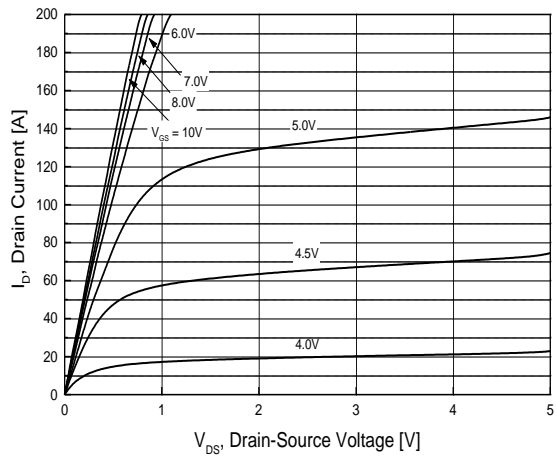
Part Number	Temp. Range	Package	Packing	RoHS Status
MDE1991RH	-55~150°C	TO-263	Reel	Halogen Free

## Electrical Characteristics (T<sub>J</sub> =25°C)

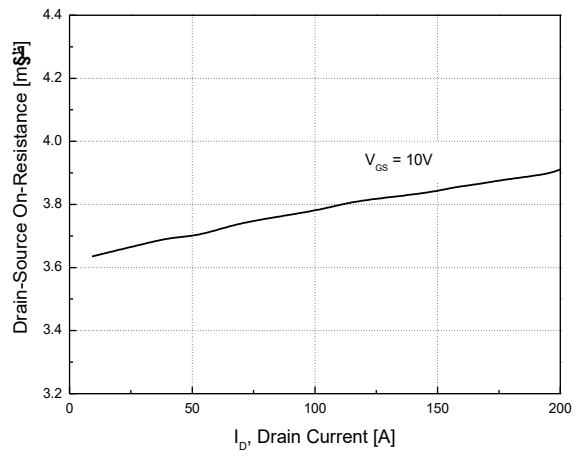
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	100	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.0	2.9	4.0	
Drain Cut-Off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 80V, V <sub>GS</sub> = 0V	-	-	1.0	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±0.1	
Drain-Source ON Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 50A	-	3.7	4.4	mΩ
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 50A	-	140	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 50V, I <sub>D</sub> = 50A, V <sub>GS</sub> = 10V	-	115	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	28	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	26	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V, f = 1.0MHz	-	7300	-	pF
Output Capacitance	C <sub>Oss</sub>		-	1360	-	
Reverse Transfer Capacitance	C <sub>Rss</sub>		-	50	-	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 50V, I <sub>D</sub> = 50A, R <sub>G</sub> = 3.0Ω	-	30	-	ns
Rise Time	t <sub>r</sub>		-	20	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	99	-	
Fall Time	t <sub>f</sub>		-	37	-	
Gate Resistance	R <sub>g</sub>	f=1 MHz	-	2.5	-	Ω
<b>Drain-Source Body Diode Characteristics</b>						
Source-Drain Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 50A, V <sub>GS</sub> = 0V	-	0.9	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 50A, di/dt = 100A/μs	-	73	-	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>		-	150	-	nC

Note :

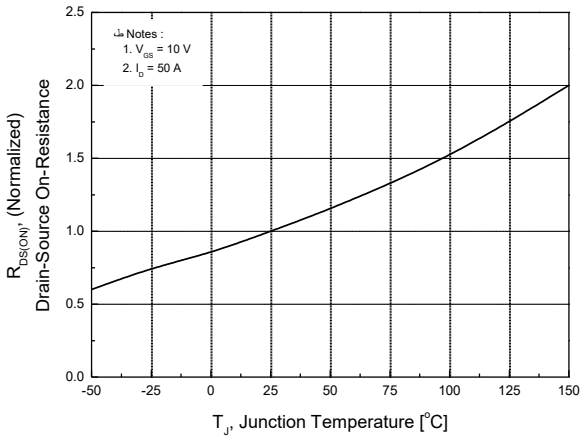
1. Surface mounted FR-4 board by JEDEC (jesd51-7). Continuous current at T<sub>C</sub>=25°C is silicon limited
2. E<sub>AS</sub> is tested at starting T<sub>J</sub> = 25°C, L = 1.0mH, I<sub>AS</sub> = 28.0A, V<sub>GS</sub> = 10V.
3. Pulse width limited by T<sub>Jmax</sub>



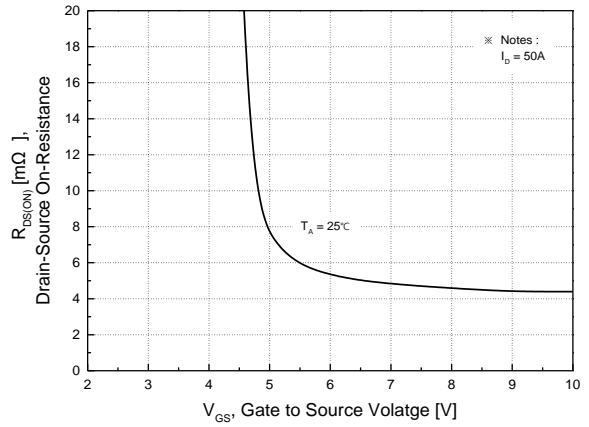
**Fig.1 On-Region Characteristics**



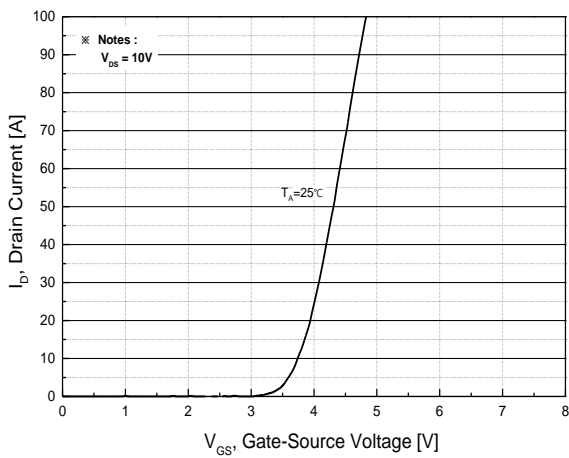
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



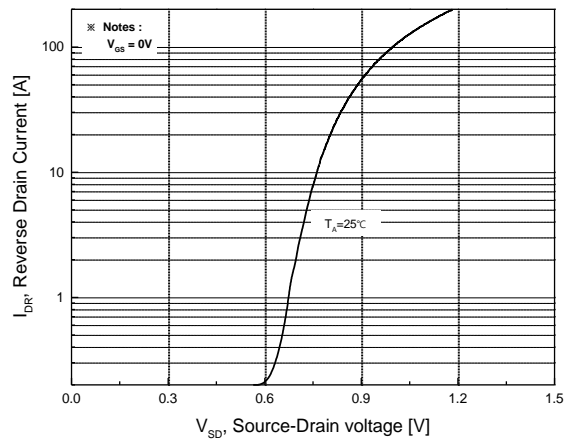
**Fig.3 On-Resistance Variation with Temperature**



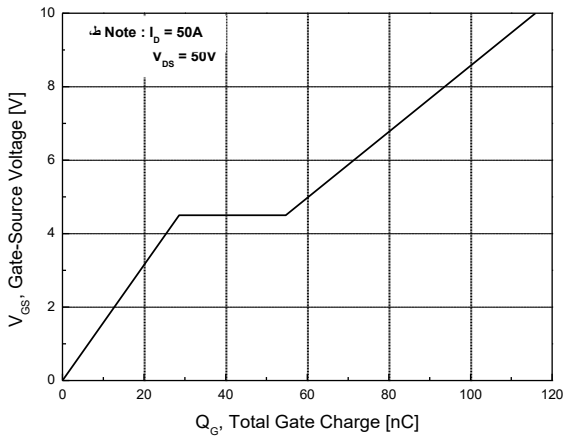
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



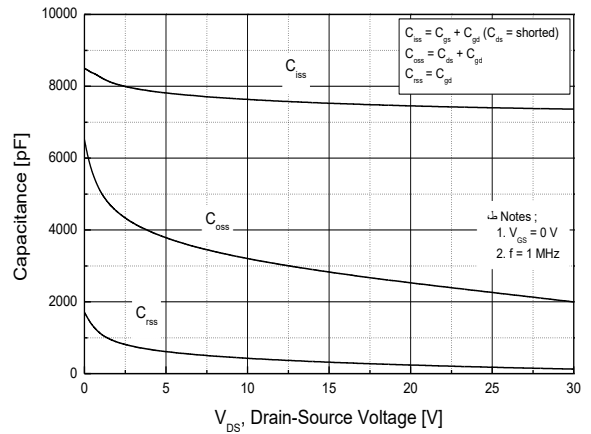
**Fig.5 Transfer Characteristics**



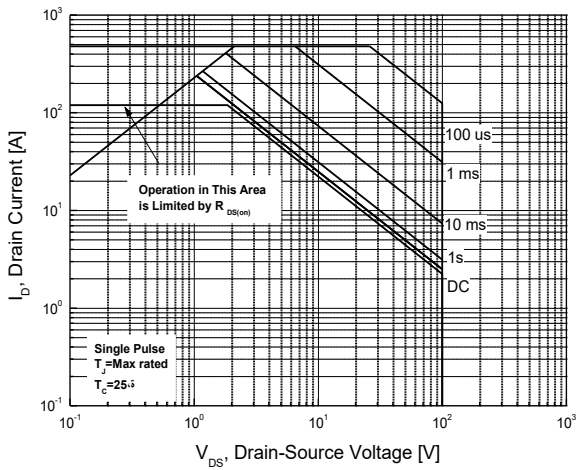
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



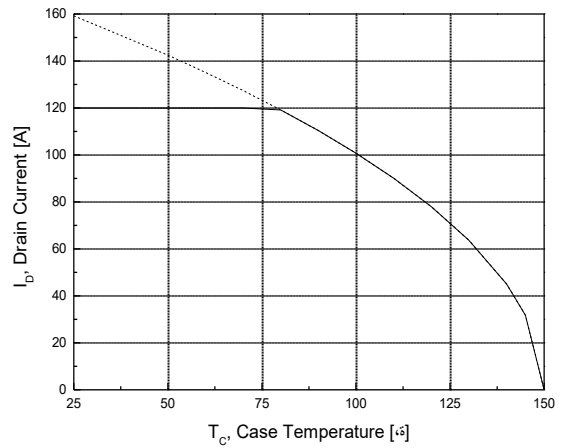
**Fig.7 Gate Charge Characteristics**



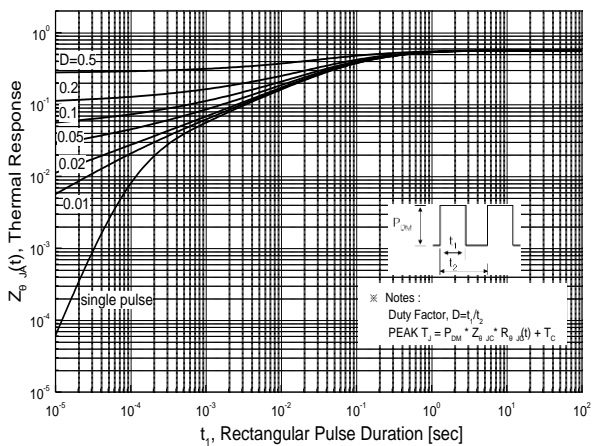
**Fig.8 Capacitance Characteristics**



**Fig.9 Maximum Safe Operating Area**



**Fig.10 Maximum Drain Current vs. Case Temperature**

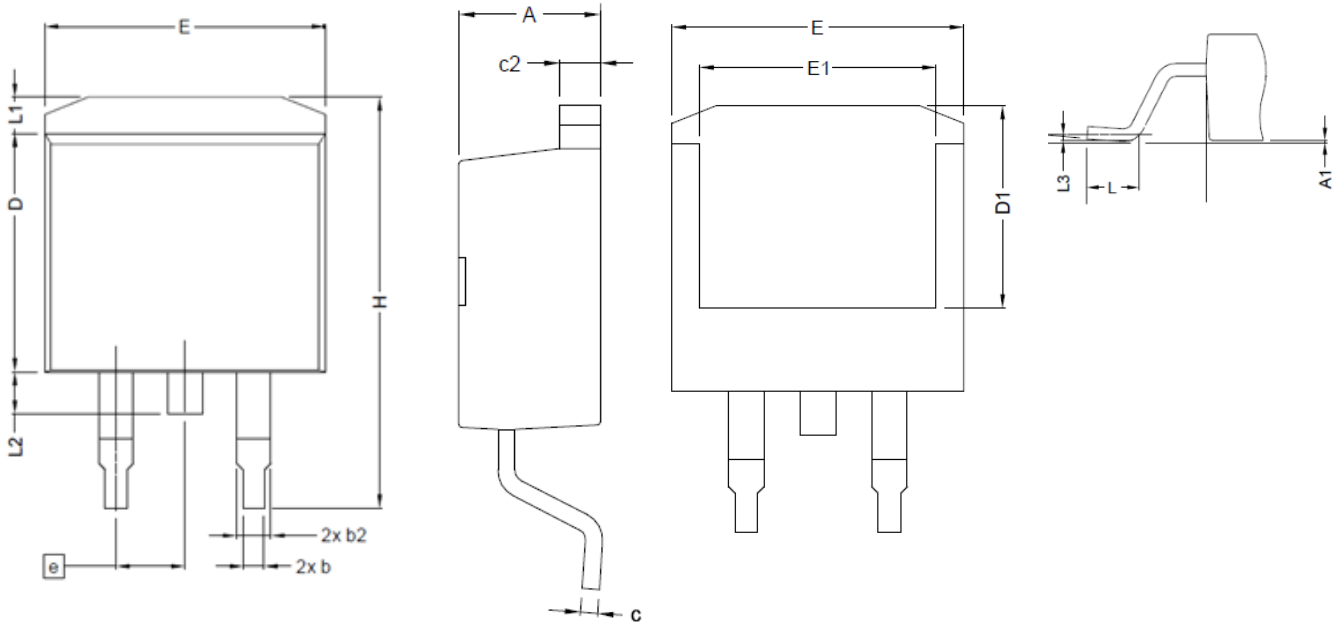


**Fig.11 Transient Thermal Response Curve**

## Package Dimension

### 3 Leads, TO-263

Dimensions are in millimeters unless otherwise specified



Symbol	Millimeters (mm)	
	Min	Max
A	4.064	4.826
A1	-	0.254
b	0.508	0.99
b2	1.140	1.778
c	0.310	0.736
c2	1.140	1.650
D	8.382	9.652
D1	6.6	-
E	9.652	10.668
E1	6.223	-
e	BSC 2.54	
H	14.605	15.875
L	1.778	2.794
L1	-	1.676
L2	-	1.778
L3	BSC 0.254	

**DISCLAIMER:**

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