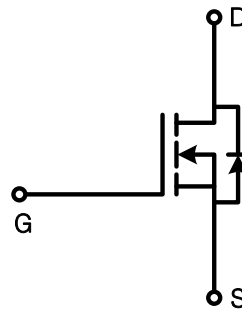


### General Description

The MDU1538 uses advanced MagnaChip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance and excellent quality. MDU1538 is suitable device for DC/DC Converter and general purpose applications.

### Features

- $V_{DS} = 30V$
- $I_D = 48A @ V_{GS} = 10V$
- $R_{DS(ON)} < 4.2 m\Omega @ V_{GS} = 10V$   
 $< 6.2 m\Omega @ V_{GS} = 4.5V$
- 100% UIL Tested
- 100% Rg Tested



PDFN56

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

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		$V_{DSS}$	30	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current <sup>(1)</sup>	$T_C=25^\circ C$ (Silicon Limited)	$I_D$	94	A
	$T_C=25^\circ C$ (Package Limited)		48	
	$T_A=70^\circ C$ (Silicon Limited)		75	
	$T_A=25^\circ C$		31	
	$T_A=70^\circ C$		24	
Pulsed Drain Current		$I_{DM}$	192	
Power Dissipation	$T_C=25^\circ C$	$P_D$	52	W
	$T_C=70^\circ C$		33	
	$T_A=25^\circ C$		5.5	
	$T_A=70^\circ C$		3.5	
Single Pulse Avalanche Energy <sup>(2)</sup>		$E_{AS}$	31	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>	$R_{\theta JA}$	22.7	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.4	

## Ordering Information

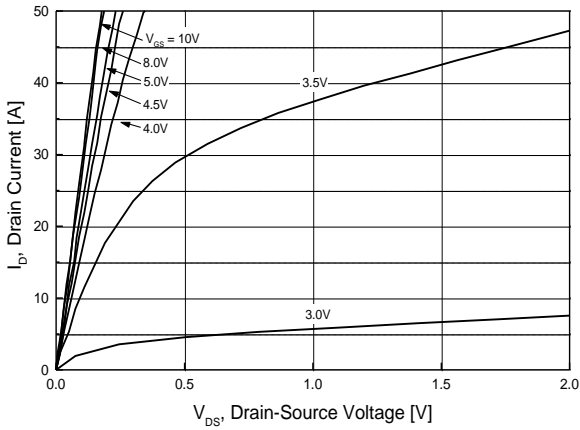
Part Number	Temp. Range	Package	Packing	RoHS Status
MDU1538RH	-55~150°C	PDFN56	Tape & Reel	Halogen Free

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

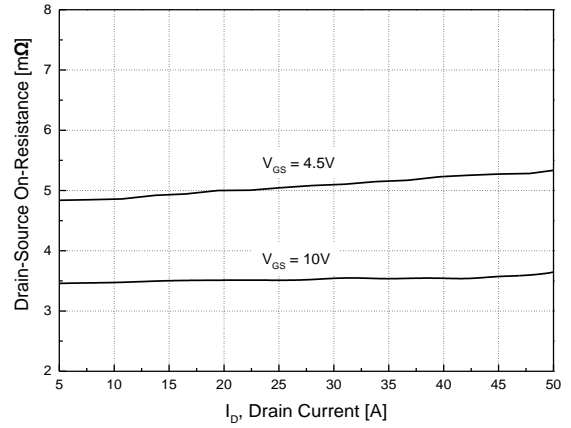
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	30	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1.3	1.9	2.7	
Drain Cut-Off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V	-	-	1	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±100	nA
Drain-Source ON Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 22A	-	3.6	4.2	mΩ
		T <sub>J</sub> =125°C	-	4.7	5.5	
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 18A	-	5.2	6.2	
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = 5V, I <sub>D</sub> = 22A	-	49	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	Q <sub>g(10V)</sub>	V <sub>DD</sub> = 15V, I <sub>D</sub> = 22A, V <sub>GS</sub> = 10V	22.7	32.4	42.1	nC
Total Gate Charge	Q <sub>g(4.5V)</sub>		9.9	14.2	18.4	
Gate-Source Charge	Q <sub>gs</sub>		-	6.7	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	3.8	-	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz	1540	2157	2800	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		68	90	117	
Output Capacitance	C <sub>oss</sub>		5567	785	1020	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 15.0V, I <sub>D</sub> = 22A, R <sub>G</sub> =3.0Ω	-	11.4	-	ns
Rise Time	t <sub>r</sub>		-	12.6	-	
Turn-Off Delay Time	t <sub>d(off)</sub>		-	34.3	-	
Fall Time	t <sub>f</sub>		-	9.86	-	
Gate Resistance	R <sub>g</sub>	f=1 MHz	-	1.4	3.0	Ω
<b>Drain-Source Body Diode Characteristics</b>						
Source-Drain Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 22A, V <sub>GS</sub> = 0V	-	0.82	1.1	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 22A, dI/dt = 100A/μs	-	39	58.5	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>		-	44.2	66.1	nC

### Note :

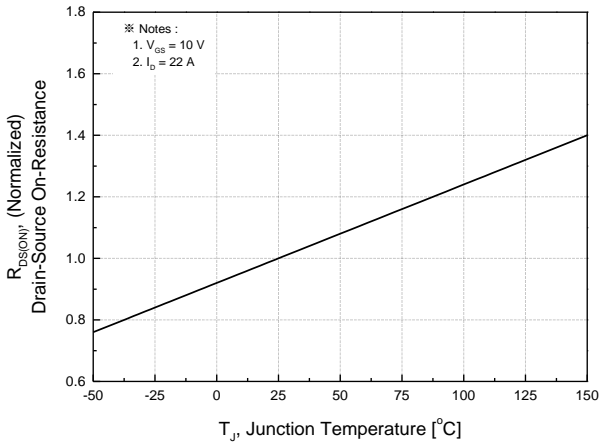
- Surface mounted FR-4 board by JEDEC (jesd51-7). Continuous current at T<sub>C</sub>=25°C is silicon limited
- E<sub>AS</sub> is tested at starting T<sub>J</sub> = 25°C, L = 0.1mH, I<sub>AS</sub> = 25A, V<sub>DD</sub> = 27V, V<sub>GS</sub> = 10V



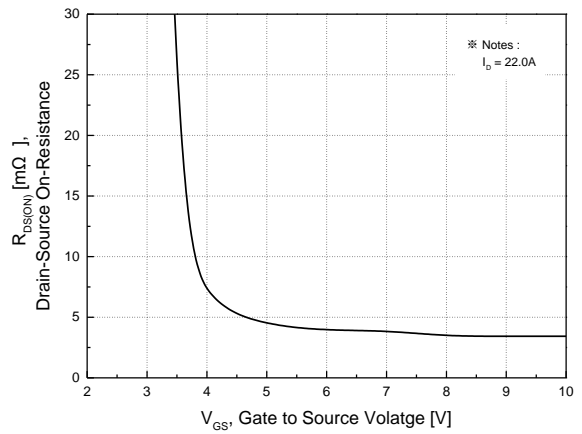
**Fig.1 On-Region Characteristics**



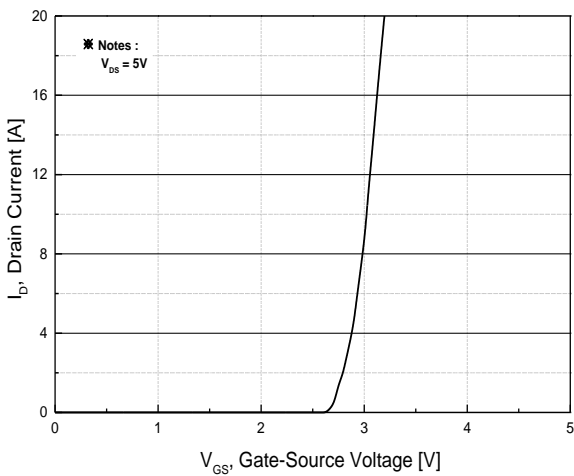
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



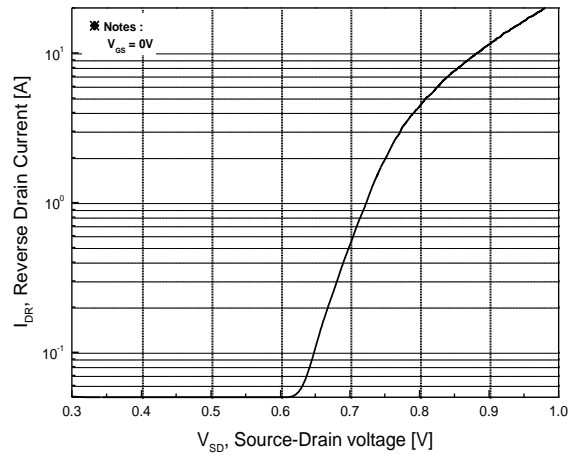
**Fig.3 On-Resistance Variation with Temperature**



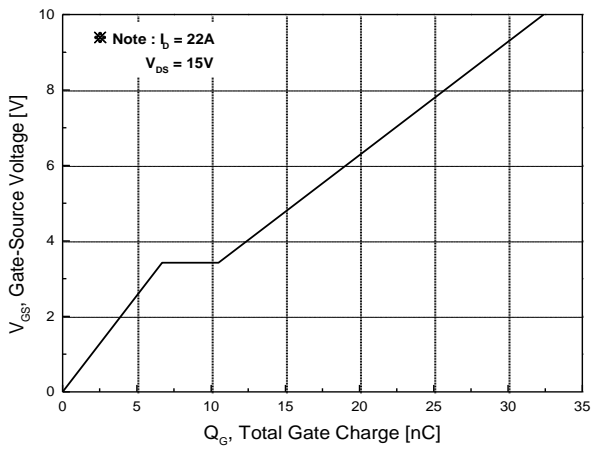
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



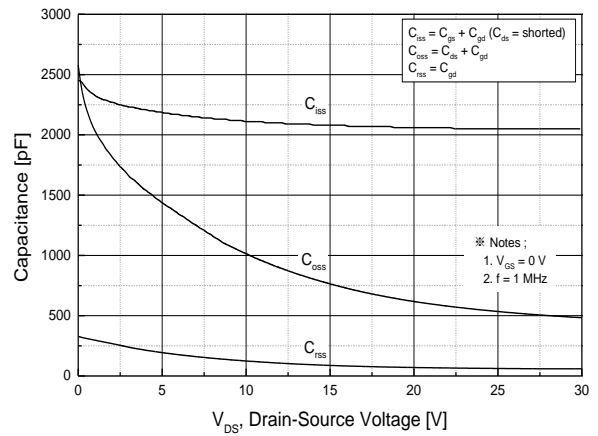
**Fig.5 Transfer Characteristics**



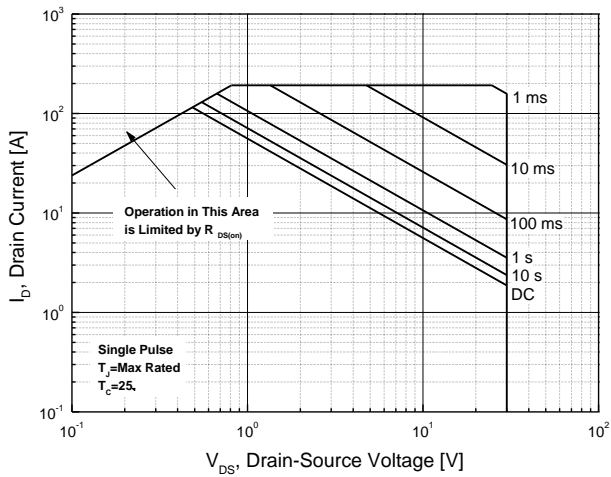
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



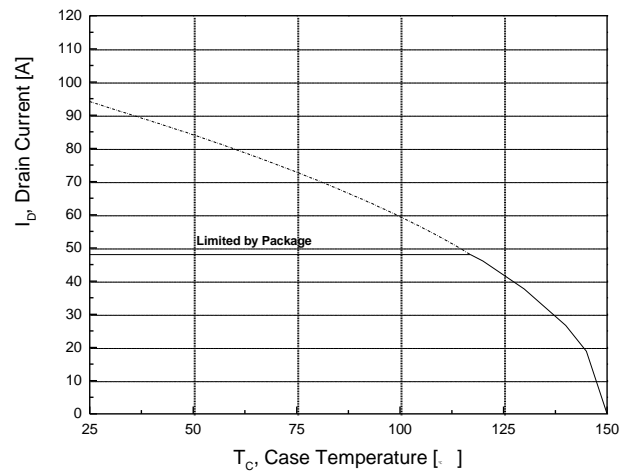
**Fig.7 Gate Charge Characteristics**



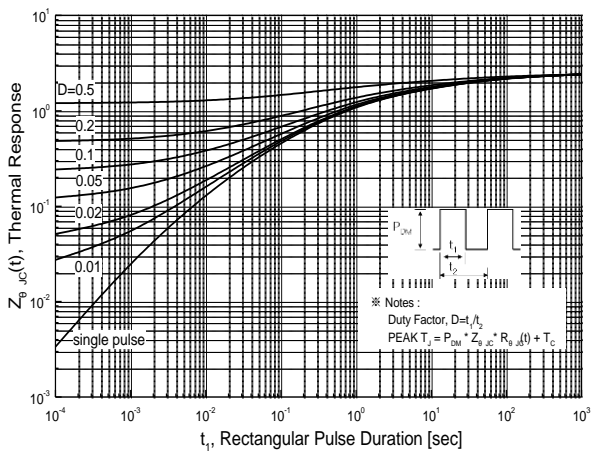
**Fig.8 Capacitance Characteristics**



**Fig.9 Maximum Safe Operating Area**



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

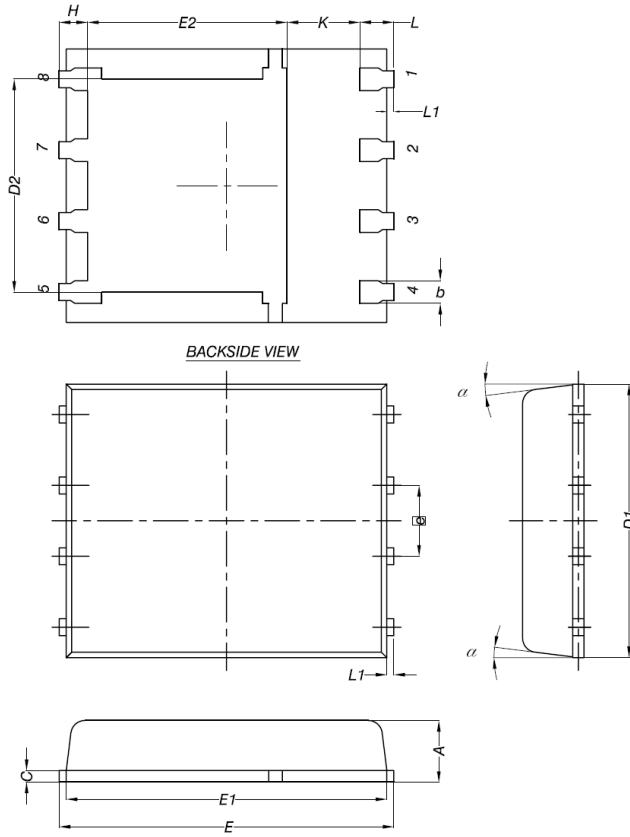


**Fig.11 Transient Thermal Response Curve**

## Package Dimension

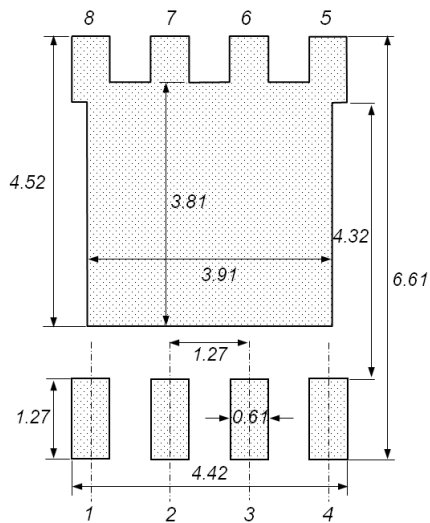
### PDFN56 (5x6mm<sup>2</sup>)

Dimensions are in millimeters, unless otherwise specified



Dimension	MILLIMETERS	
	Min	Max
A	0.90	1.10
b	0.33	0.51
C	0.20	0.34
D1	4.50	5.10
D2	-	4.22
E	5.90	6.30
E1	5.50	6.10
E2	-	4.30
e	1.27BSC	
H	0.41	0.71
K	0.20	-
L	0.51	0.71
$\alpha$	0°	12°

### Land Pattern



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