MagnaChip

MDU1401S

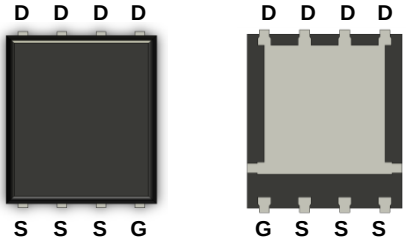
Single N-channel Trench MOSFET 25V

General Description

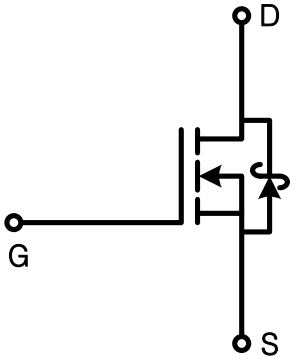
The MDU1401S uses advanced MagnaChip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance and excellent quality. MDU1401S is suitable device for DC/DC Converter and general purpose applications.

Features

- V_{DS} = 25V
- I_D = 100A @V_{GS} = 10V
- $R_{DS(ON)}$
  < 1.05 mΩ @V_{GS} = 10V
  < 1.40 mΩ @V_{GS} = 4.5V
- 100% UIL Tested
- 100% Rg Tested
- SBD Built In



PDFN56



Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	25	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current [1]	T_C=25°C (Silicon Limited)	I_D	239	A
	T_C=25°C (Package Limited)		100	
	T_A=25°C		45	
Pulsed Drain Current		I_{DM}	100	
Power Dissipation	T_C=25°C	P_D	96	W
	T_A=25°C		2.5	
Single Pulse Avalanche Energy [2]		E_{AS}	100	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	°C

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient [1]	$R_{\theta JA}$	50	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.3	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDU1401SVRH	-55~150°C	PDFN56	Tape & Reel	Halogen Free

Electrical Characteristics (T_J =25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 1mA, V_{GS} = 0V	25	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.5	2.0	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V	-	-	0.5	mA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 30A	-	0.9	1.05	mΩ
		V_{GS} = 4.5V, I_D = 30A	-	1.1	1.4	
Forward Transconductance	g_{fs}	V_{DS} = 5V, I_D = 30A	-	63	-	S
Dynamic Characteristics						
Total Gate Charge	$Q_{g(10V)}$	V_{DD} = 12V, I_D = 30A, V_{GS} = 10V	-	70.0	-	nC
Gate-Source Charge	Q_{gs}		-	12.5	-	
Gate-Drain Charge	Q_{gd}		-	7.0	-	
Input Capacitance	C_{iss}	V_{DS} = 12V, V_{GS} = 0V, f = 1.0MHz	-	6,000	-	pF
Reverse Transfer Capacitance	C_{rss}		-	200	-	
Output Capacitance	C_{oss}		-	2,400	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DD} = 12.0V, I_D = 30A , R_G = 1.6Ω	-	18.0	-	ns
Rise Time	t_r		-	12.0	-	
Turn-Off Delay Time	$t_{d(off)}$		-	58.0	-	
Fall Time	t_f		-	12.0	-	
Gate Resistance	R_g	f=1 MHz	0.5	1.2	2.0	Ω
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V	-	0.4	0.7	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 30A, dI/dt = 150A/μs	-	50	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	110	-	nC

Note :

1. Surface mounted FR-4 board by JEDEC (jesd51-7). Continuous current at T_C=25℃ is silicon limited
2. E_{AS} is tested at starting T_j = 25℃, L = 1.0mH, I_{AS} = 20A, V_{DD} = 25V, V_{GS} = 10V. And 100% UIL Test at L = 0.1mH, I_{AS} = 33.6A

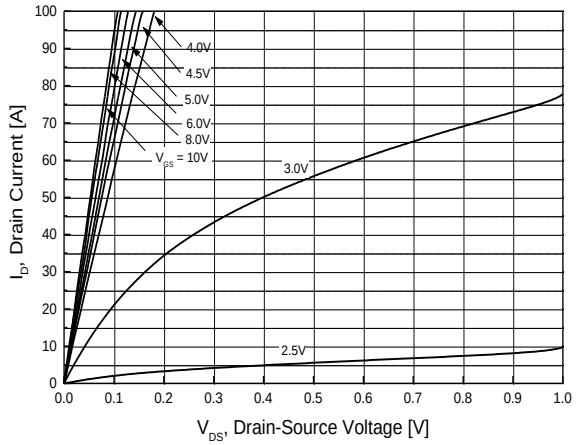


Fig.1 On-Region Characteristics

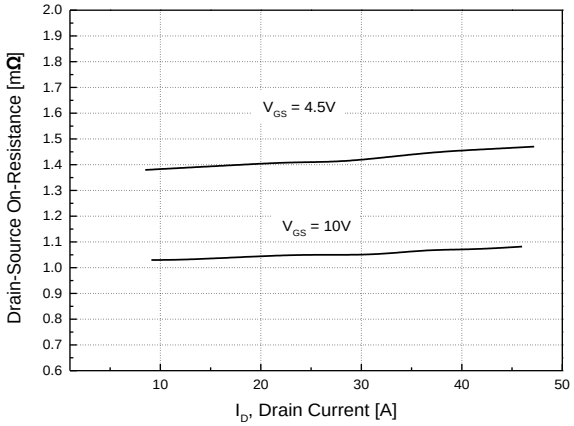


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

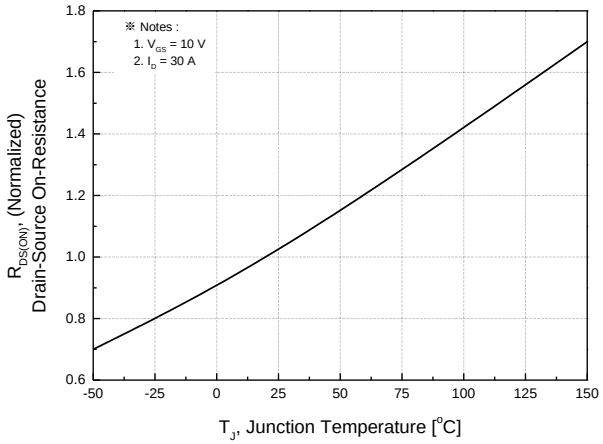


Fig.3 On-Resistance Variation with Temperature

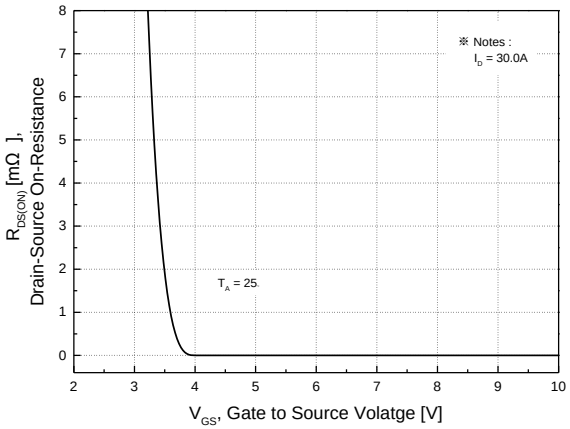


Fig.4 On-Resistance Variation with Gate to Source Voltage

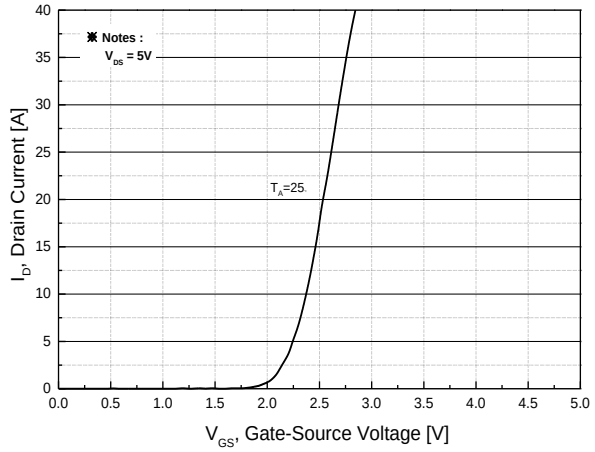


Fig.5 Transfer Characteristics

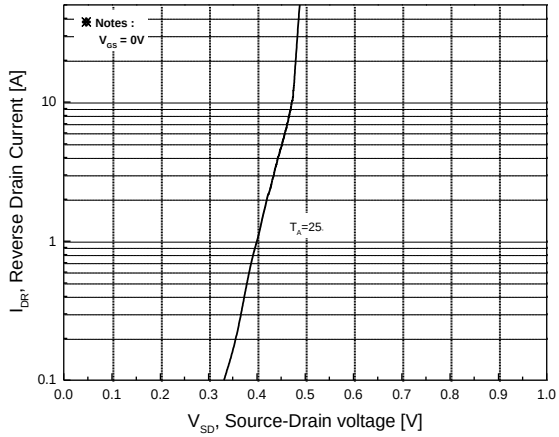


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

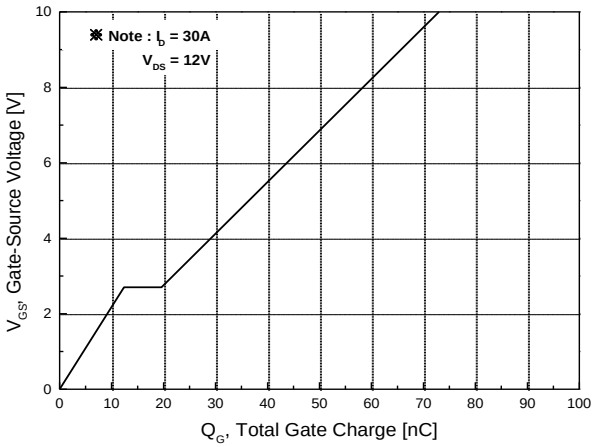


Fig.7 Gate Charge Characteristics

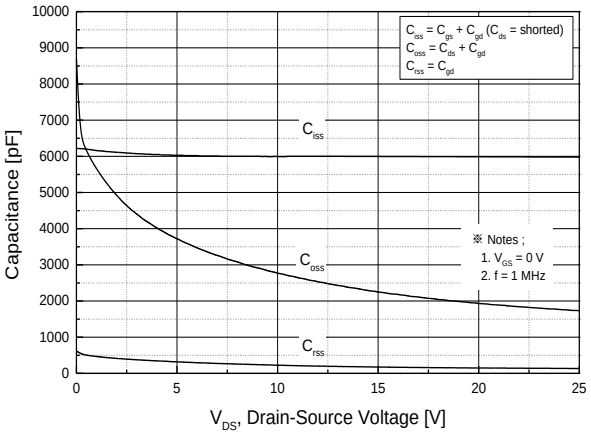


Fig.8 Capacitance Characteristics

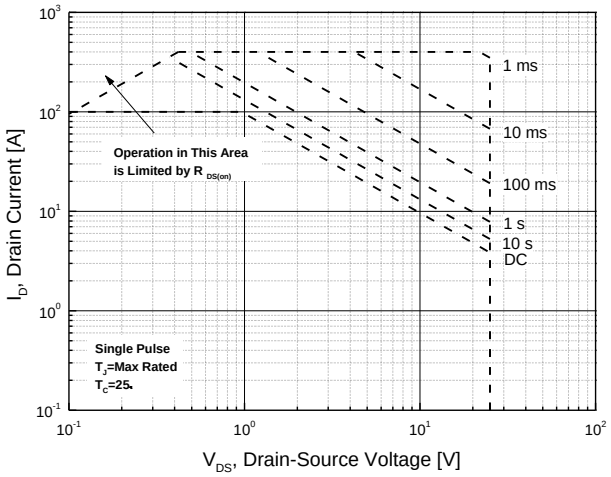


Fig.9 Maximum Safe Operating Area

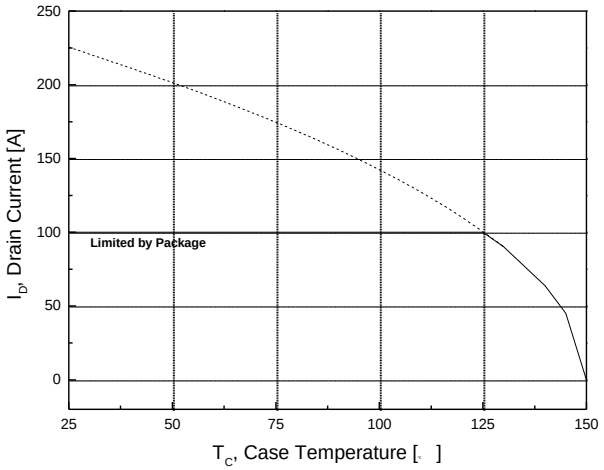


Fig.10 Maximum Drain Current vs. Case Temperature

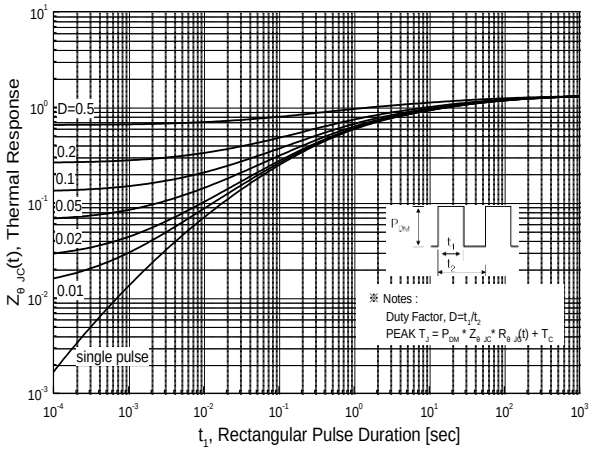
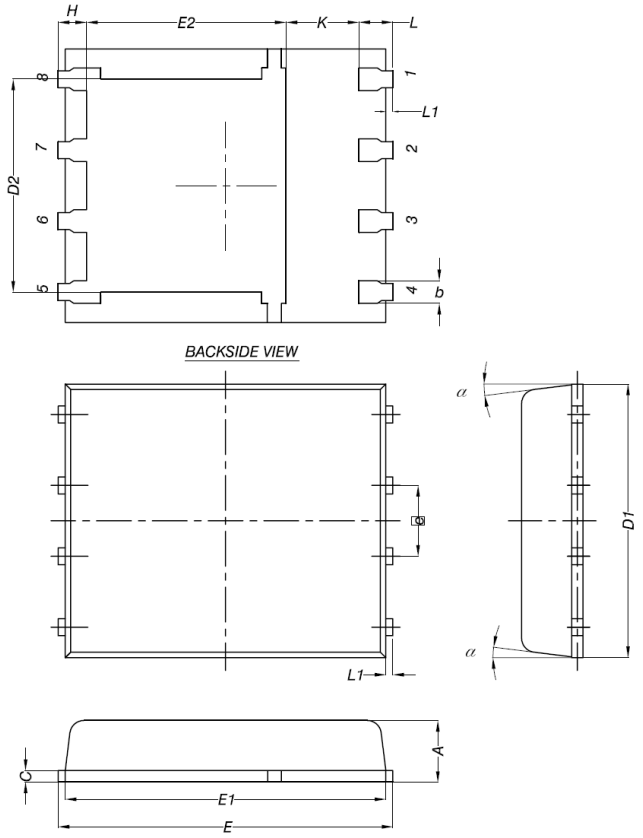


Fig.11 Transient Thermal Response Curve

Package Dimension

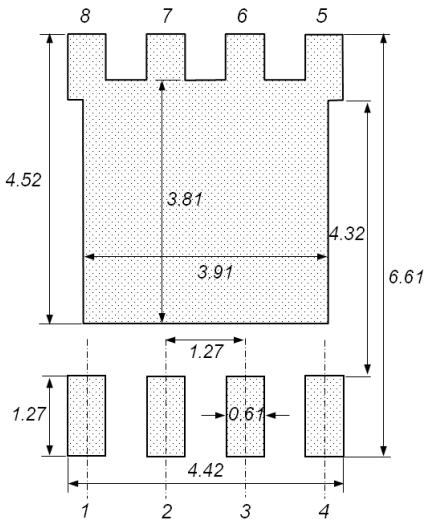
PDFN56 (5x6mm)

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
α	0°	12°

Land Pattern



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