RoHS Compliant

MagnaChip

MDS5601

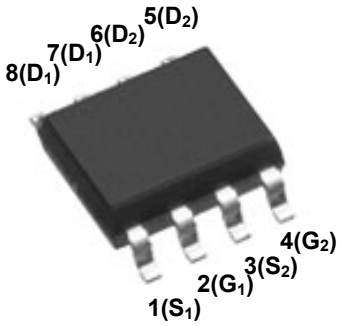
Dual N-channel Trench MOSFET 30V, 12.9A, 10.5mΩ

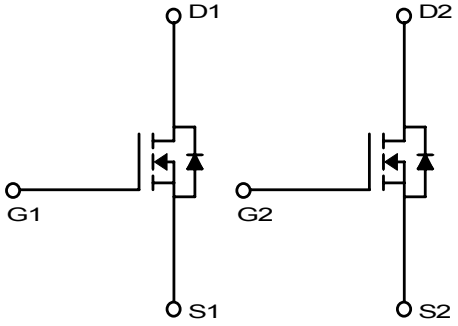
General Description

The MDS5601 uses advanced MagnaChip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance and excellent quality. MDS5601 is suitable for DC/DC converter and general purpose applications.

Features

- V_{DS} = 30V
- I_D = 12.9A @V_{GS} = 10V
- $R_{DS(ON)}$
  < 10.5mΩ @V_{GS} = 10V
  < 16.1mΩ @V_{GS} = 4.5V
- 100% UIL Tested
- 100% Rg Tested





Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current [1]	T_C=25°C	I_D	12.9	A
	T_C=70°C		10.4	
	T_A=25°C		10.0[3]	
	T_A=70°C		8.0[3]	
Pulsed Drain Current		I_{DM}	40	A
Power Dissipation	T_C=25°C	P_D	3.13	W
	T_C=70°C		2.0	
	T_A=25°C		2.0[3]	
	T_A=70°C		1.28[3]	
Single Pulse Avalanche Energy [2]		E_{AS}	32	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]	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	40	

Ordering Information

Part Number	Temp. Range	Package	Packing	Rohs Status
MDS5601URH	-55~150°C	SO-8	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 = 250μA, V_{GS} = 0V	30	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.3	2.0	2.7	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
		T_J=55°C	-	-	5	
Gate Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±0.1	
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 9.0A	-	9.5	10.5	mΩ
		T_J=125°C	-	14.3	18.8	
		V_{GS} = 4.5V, I_D = 7.0A	-	13.1	16.1	
Forward Transconductance	g_{fs}	V_{DS} = 10V, I_D = 9A`	-	35	-	S
Dynamic Characteristics						
Total Gate Charge	$Q_{g(10V)}$	V_{DS} = 15.0V, I_D = 9.0A, V_{GS} = 10V	11.0	15.7	-20.4	nC
Total Gate Charge	$Q_{g(4.5V)}$		5.4	7.7	10.0	
Gate-Source Charge	Q_{gs}		-	3.4	-	
Gate-Drain Charge	Q_{gd}		-	2.5	-	
Input Capacitance	C_{iss}	V_{DS} = 15.0V, V_{GS} = 0V, f = 1.0MHz	682	975	1268	pF
Reverse Transfer Capacitance	C_{rss}		98	97	126	
Output Capacitance	C_{oss}		143	204		
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 15.0V, R_L = 1.5Ω, R_G = 3.0Ω	-	5.9	-	ns
Rise Time	t_r		-	21.3	-	
Turn-Off Delay Time	$t_{d(off)}$		-	21.4	-	
Fall Time	t_f		-	12.4	-	
Gate Resistance	Rg	f=1 MHz	-	1.6	3.0	Ω
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 1.0A, V_{GS} = 0V	-	0.72	1.0	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 9.0A, dI/dt = 100A/μs	-	27.2	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	11.5	-	nC

Note :

1. Surface mounted RF4 board with 2oz. Copper. Continuous current at T_C=25℃ is silicon limited.
2. E_{AS} is tested at starting T_j =25℃, L = 1.0mH, I_{AS} = 8A, V_{DD} = 15V, V_{GS} = 10V.
3. T < 10sec.

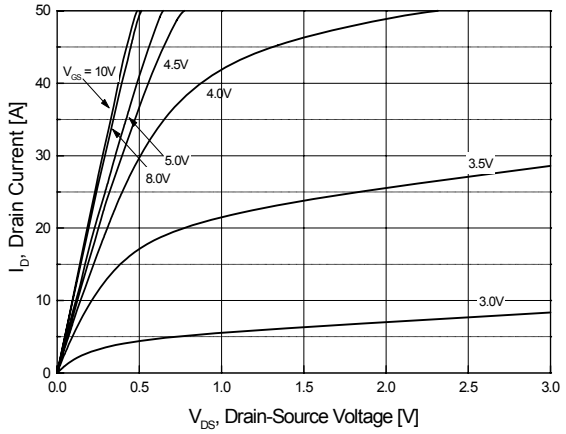


Fig.1 On-Region Characteristics

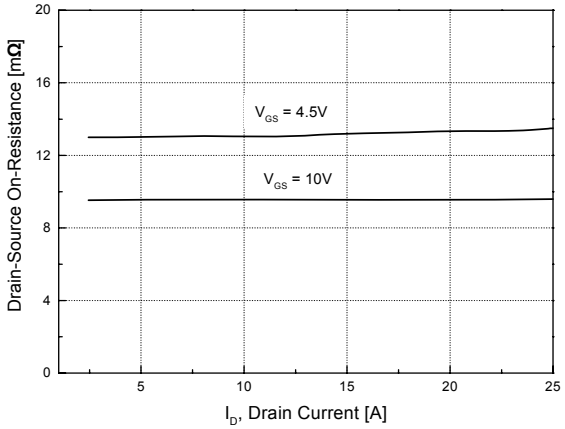


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

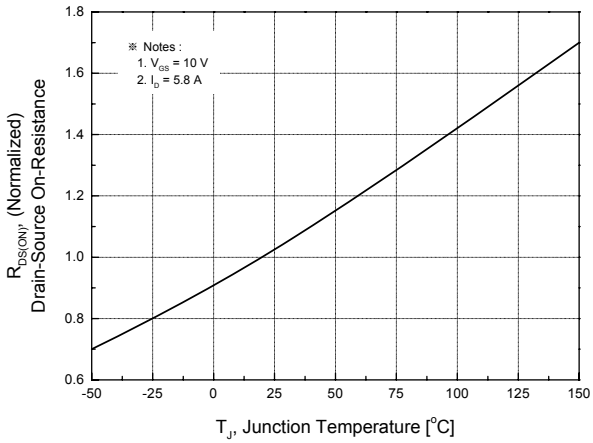


Fig.3 On-Resistance Variation with

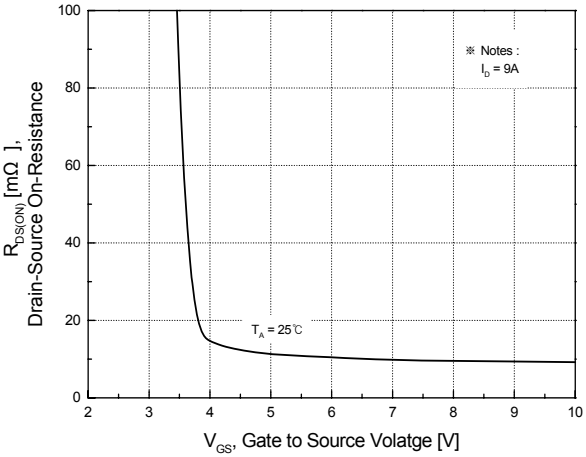


Fig.4 On-Resistance Variation with Gate to Source Voltage

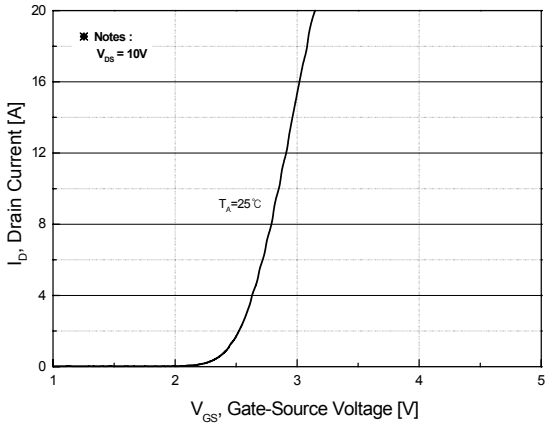


Fig.5 Transfer Characteristics

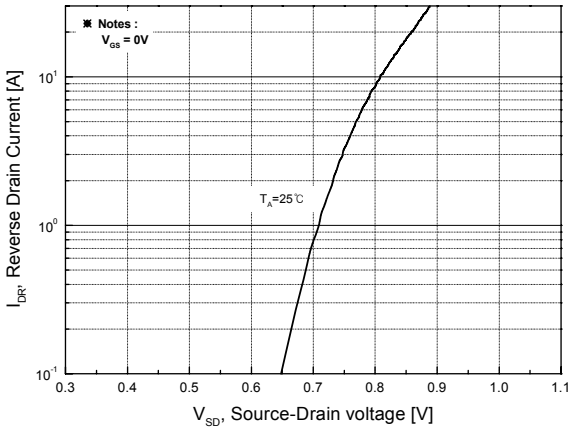


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

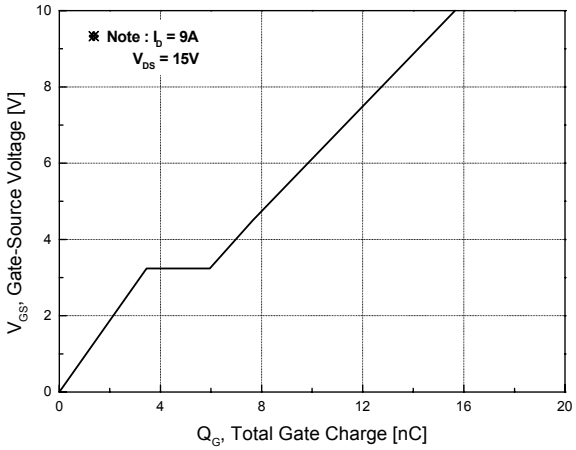


Fig.7 Gate Charge Characteristics

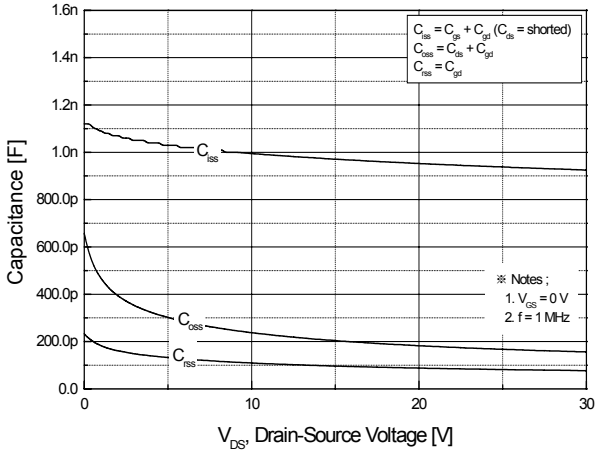


Fig.8 Capacitance Characteristics

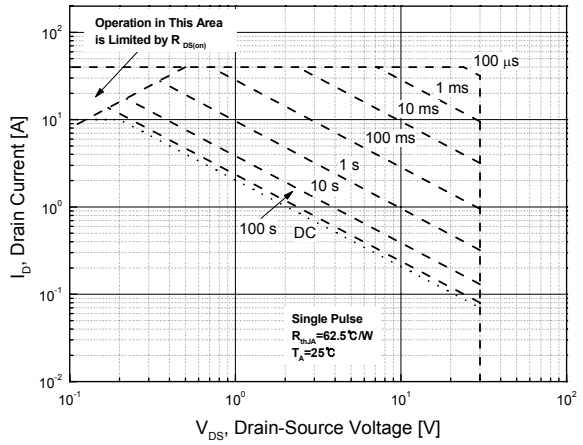


Fig.9 Maximum Safe Operating Area

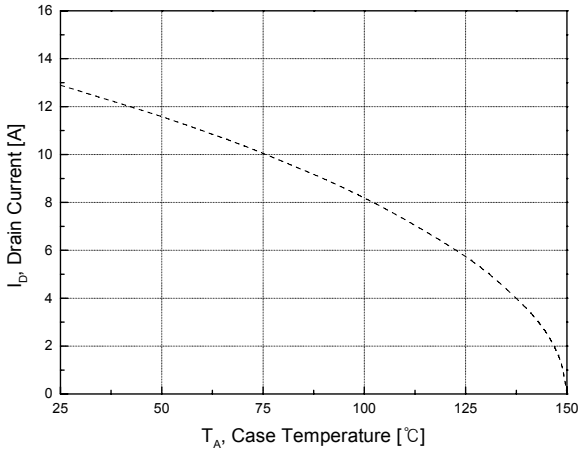


Fig.10 Maximum Drain Current vs. Case Temperature

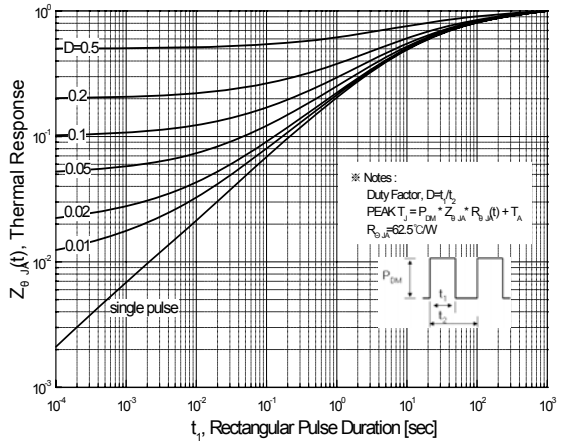
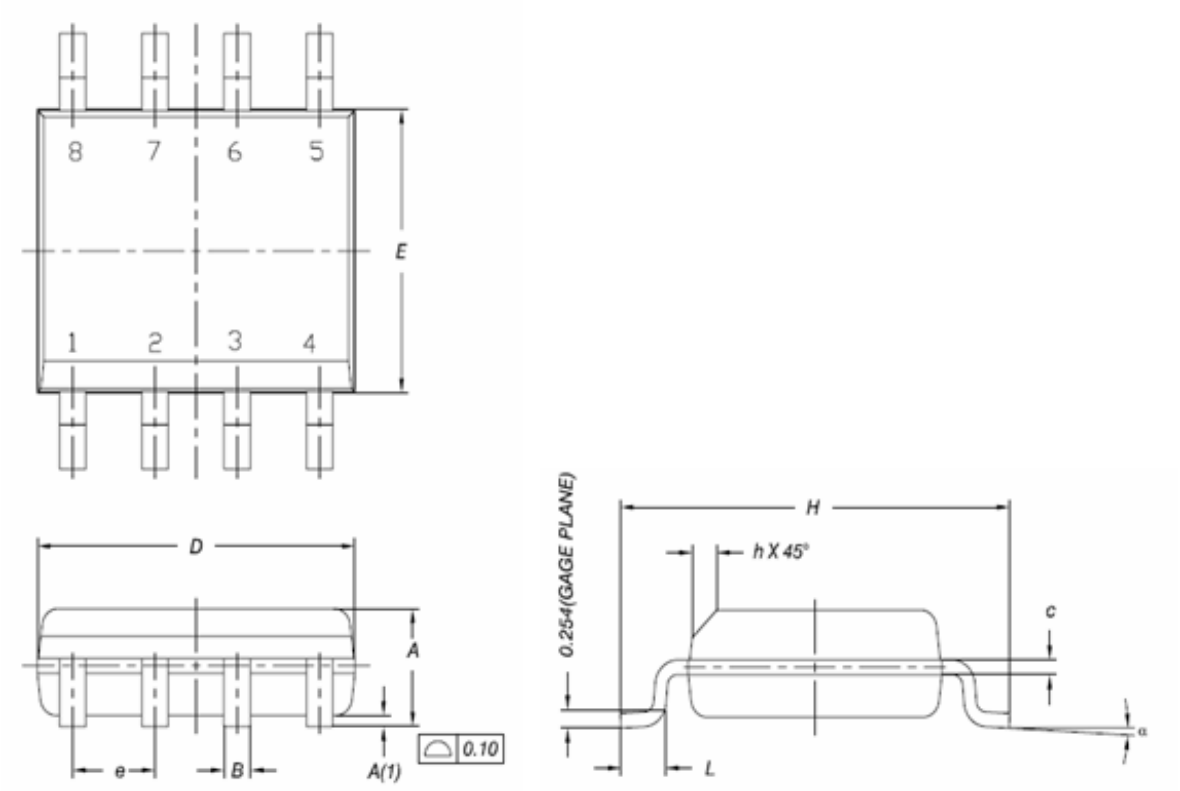


Fig.11 Transient Thermal Response Curve

Physical Dimensions

8 Leads SOIC

Dimensions are in millimeters unless otherwise specified



Symbol	Min.	Nom.	Max.
A	-	-	1.75
A(1)	0.10	-	0.25
B	0.31	-	0.51
C	0.10	-	0.25
D	-	4.9 BSC	-
E	-	3.9 BSC	-
e		1.27BSC	
H	-	6.0 BSC	-
L	0.40	-	1.27
a	0	-	8
h	0.250	-	0.500
L2(Gage Plane)		0.25 BSC	

DISCLAIMER:

The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. Seller's customers using or selling Seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

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