RoHS Compliant
HALOGEN-FREE

Magnachip

MDS1651

Single N-Channel Trench MOSFET 30V, 11.6A, 17mΩ

General Description

The MDS1651 uses advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent reliability.

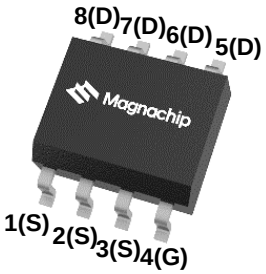
MDS1651 is suitable device for PWM, Load Switching and general purpose applications.

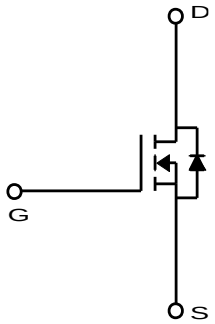
Features

- V_{DS} = 30V
- I_D = 11.6A@V_{GS} = 10V
- $R_{DS(ON)}$
  < 17mΩ @V_{GS} = 10V
  < 22mΩ @V_{GS} = 4.5V

Applications

- Portable application





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	T_C=25°C	I_D	11.6	A
	T_C=70°C		9.2	A
Pulsed Drain Current		I_{DM}	50	A
Power Dissipation (1)	T_A=25°C	P_D	3.1	W
	T_A=70°C		2	
Single Pulse Avalanche Energy (2)		E_{AS}	80	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)	$R_{\theta JA}$	40	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	24	

Ordering Information

Part Number	Temp. Range	Package	Packing
MDS1651RH	-55~150°C	SO-8	Tape & Reel

Electrical Characteristics (Ta =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	1.4	1.7	3	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
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 = 11.6A	-	12.0	17	mΩ
		V_{GS} = 4.5V, I_D = 10A	-	16.0	22	
On-State Drain Current	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 10V	50	-	-	A
Forward Transconductance	g_{fs}	V_{DS} = 5V, I_D = 11.0A	-	19	-	S
Dynamic Characteristics						
Total Gate Charge	$Q_{g(10V)}$	V_{DS} = 15V, I_D = 11.6A, V_{GS} = 10V		13.7	19.0	nC
Total Gate Charge	$Q_{g(4.5V)}$			6.8	9.5	
Gate-Source Charge	Q_{gs}		-	2.0	-	
Gate-Drain Charge	Q_{gd}		-	3.5	-	
Input Capacitance	C_{iss}	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz	-	669		pF
Reverse Transfer Capacitance	C_{rss}		-	108		
Output Capacitance	C_{oss}		-	165		
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 15V, R_L = 1.3Ω, R_G = 3Ω	-	5.0	6.5	ns
Rise Time	t_r		-	6.0	7.5	
Turn-Off Delay Time	$t_{d(off)}$		-	19.0	25.0	
Fall Time	t_f		-	4.5	6.0	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V	-	0.7	1.0	V
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 4.5A, V_{GS} = 0V	-	0.8	1.1	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 11.6A, dI/dt = 100A/μs	-	19	21	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	9	12	nC

Note :

1. Surface mounted FR-4 board with 2oz. Copper.
2. Starting T_J = 25°C, L = 1mH, I_{AS} = 5A, V_{DD} = 15V, V_{GS} = 10V.

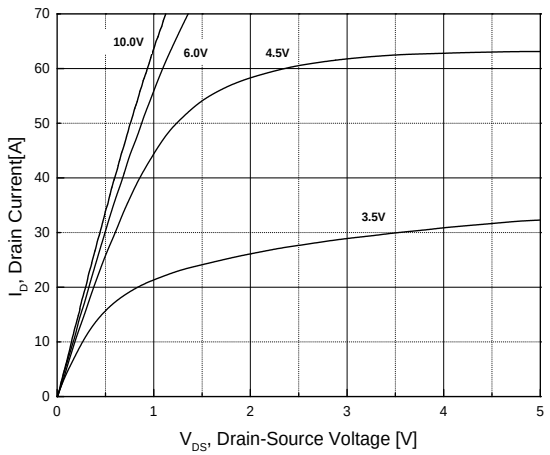


Fig.1 On-Region Characteristics

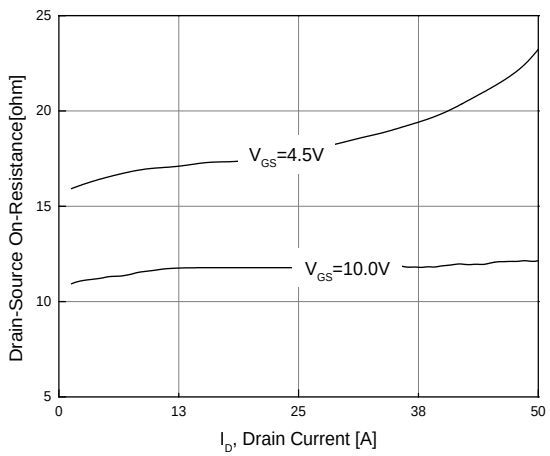


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

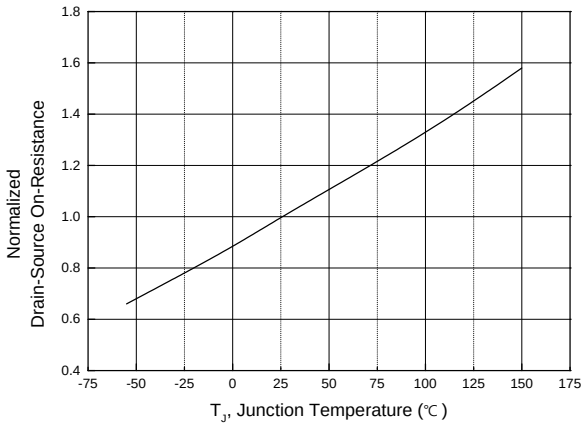


Fig.3 On-Resistance Variation with Temperature

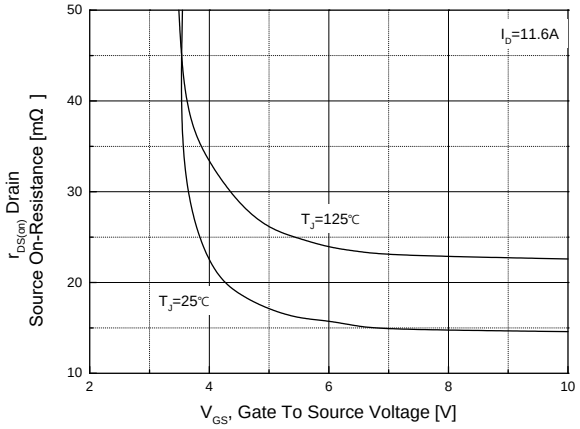


Fig.4 On-Resistance Variation with Gate to Source Voltage

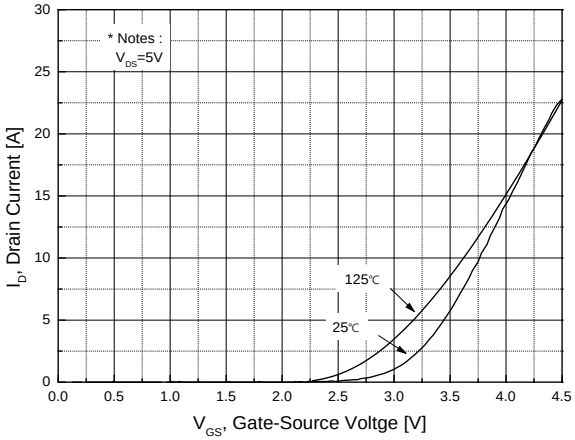


Fig.5 Transfer Characteristics

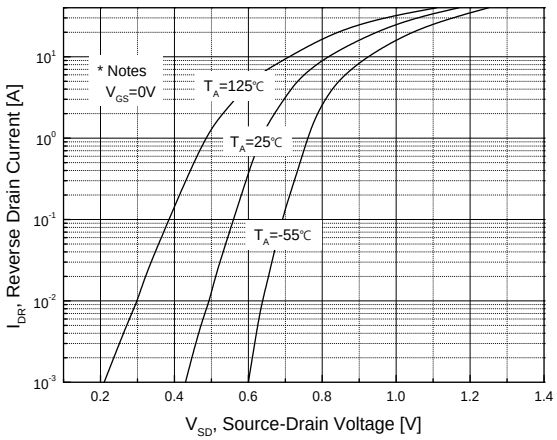


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

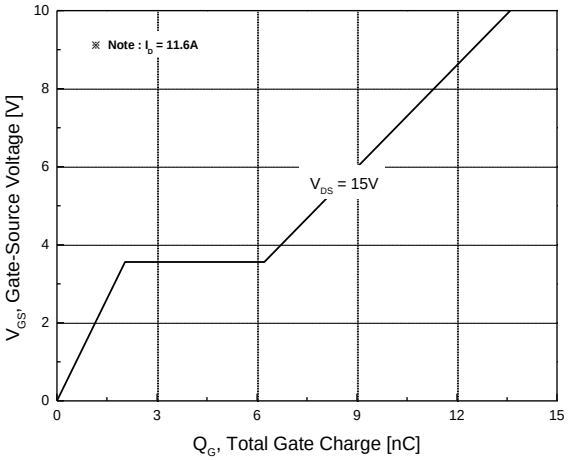


Fig.7 Gate Charge Characteristics

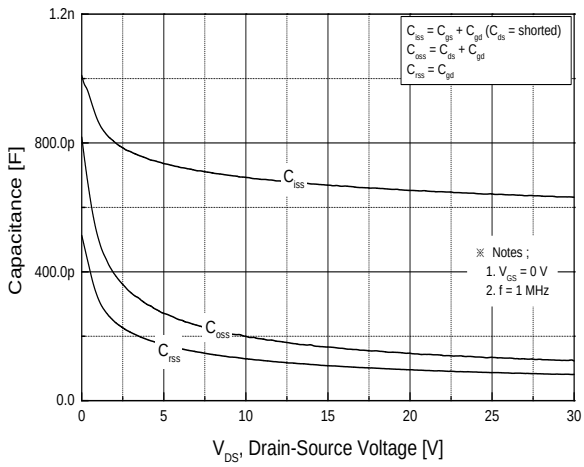


Fig.8 Capacitance Characteristics

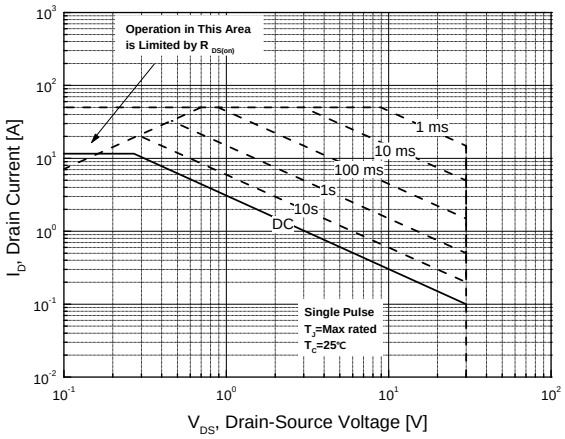


Fig.9 Maximum Safe Operating Area

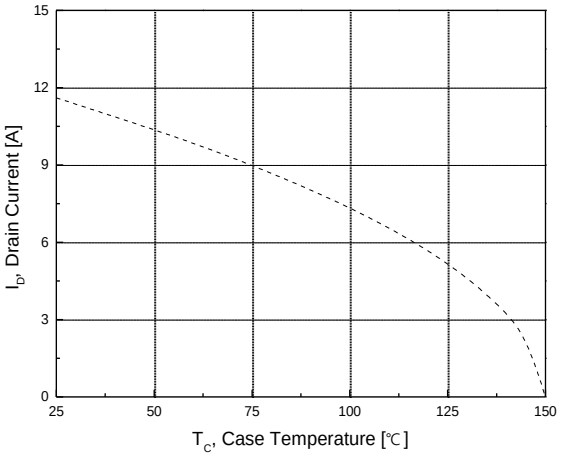


Fig.10 Maximum Drain Current vs. Case Temperature

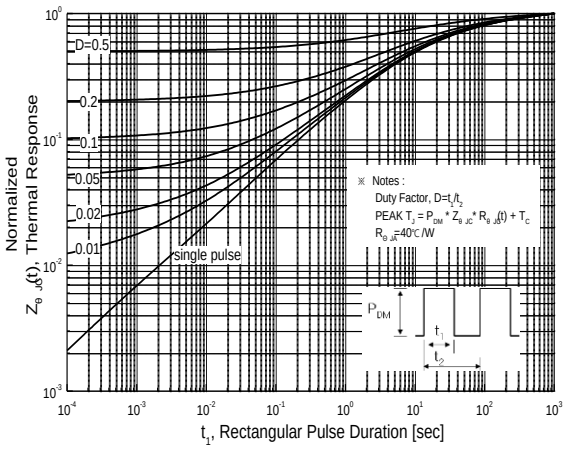
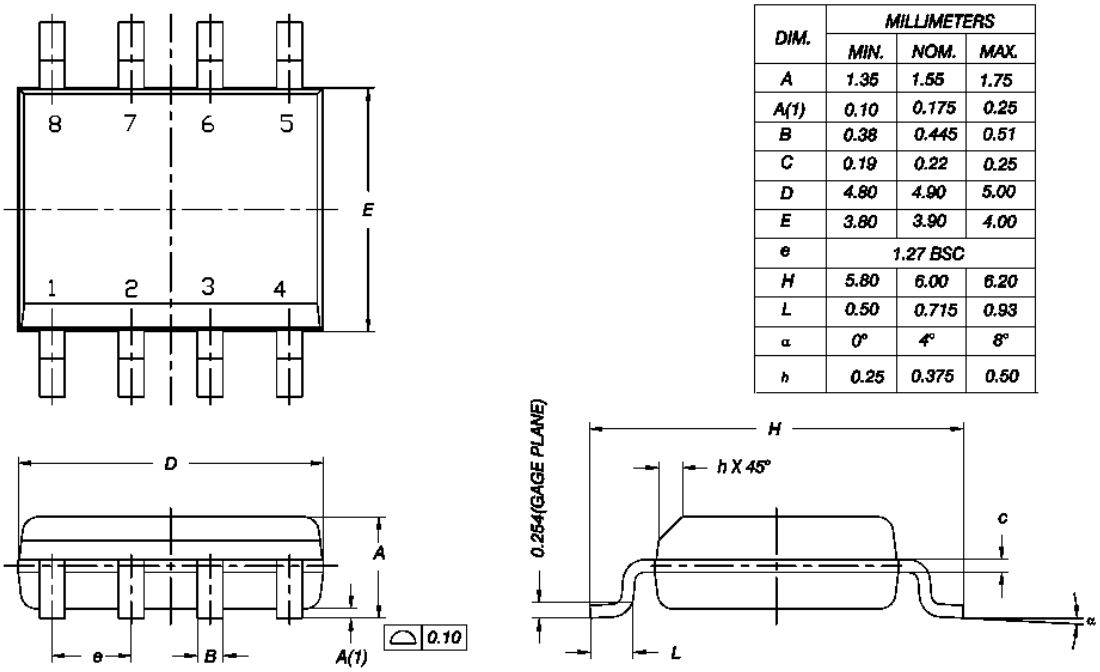


Fig.11 Transient Thermal Response Curve

Physical Dimensions

SOIC-8L

Dimensions are in millimeters unless otherwise specified



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.35	1.55	1.75
A(1)	0.10	0.175	0.25
B	0.38	0.445	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E	3.80	3.90	4.00
e	1.27 BSC		
H	5.80	6.00	6.20
L	0.50	0.715	0.93
α	0°	4°	8°
h	0.25	0.375	0.50

Note : Package body size, length and width do not include mold flash, protrusions and gate burrs.

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