RoHS Compliant
HALOGEN-FREE

Magnachip

MDS1656

Single N-Channel Trench MOSFET 30V, 7.2A, 28mΩ

General Description

The MDS1656 uses advanced Magnachip's trench MOSFET Technology to provide high performance in on-state resistance, switching performance and reliability

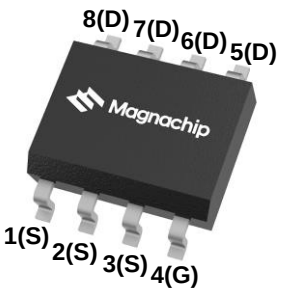
Low $R_{DS(ON)}$, low gate charge can be offering superior benefit in the application.

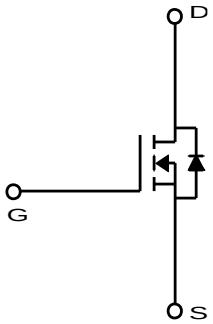
Features

- V_{DS} = 30V
- I_D = 7.2A @V_{GS} = 10V
- $R_{DS(ON)}$
  < 28mΩ @V_{GS} = 10V
  < 42mΩ @V_{GS} = 4.5V

Applications

- Inverters
- General purpose applications





Absolute Maximum Ratings (T_a =25°C unless otherwise noted)

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	7.2	A
	T_C=70°C		6.2	A
Pulsed Drain Current		I_{DM}	30	A
Power Dissipation	T_C=25°C	P_D	2	W
	T_C=70°C		1.44	
Single Pulse Avalanche Energy(2)		E_{AS}	20	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	°C

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient(Steady-State)(1)	$R_{\theta JA}$	100	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	60	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDS1656R	-55~150°C	SO-8	Tape & Reel	Halogen Free

Electrical Characteristics (T_a =25°C unless otherwise noted)

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	1.0	1.9	3.0	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 24V, 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 = 6.9A	-	21.5	28	mΩ
		V_{GS} = 4.5V, I_D = 5.0A	-	31.5	42	
On-State Drain Current	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 4.5V	20	-	-	A
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 6.9A	10	15.4	-	S
Maximum Body-Diode Continuous Current			-	-		
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = 15V, I_D = 6.9A, V_{GS} = 10V	-	6.94	-	nC
Gate-Source Charge	Q_{gs}		-	1.54	-	
Gate-Drain Charge	Q_{gd}		-	1.4	-	
Input Capacitance	C_{iss}	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz	-	334	-	pF
Reverse Transfer Capacitance	C_{rss}		-	48	-	
Output Capacitance	C_{oss}		-	83	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V ,V_{DS} = 15V, R_L = 2.2Ω, R_{GEN} = 3Ω	-	3.5	-	ns
Turn-On Rise Time	t_r		-	25.4	-	
Turn-Off Delay Time	$t_{d(off)}$		-	14.2	-	
Turn-Off Fall Time	t_f		-	10.5	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V	-	0.75	1.0	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 6.9A, di/dt = 100A/μs	-	16.5	20	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	7.8	10	nC

Notes :

1. Surface mounted FR-4 board with 2oz. Copper..
2. Starting TJ = 25°C, L = 1mH, IAS = 5A, VDD = 15V, VGS = 10V.

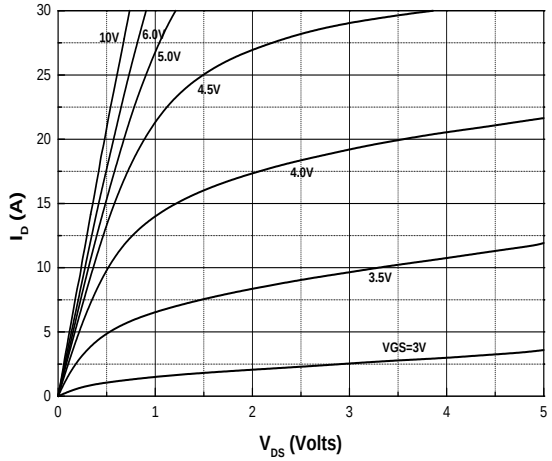


Fig.1 On-Region Characteristics

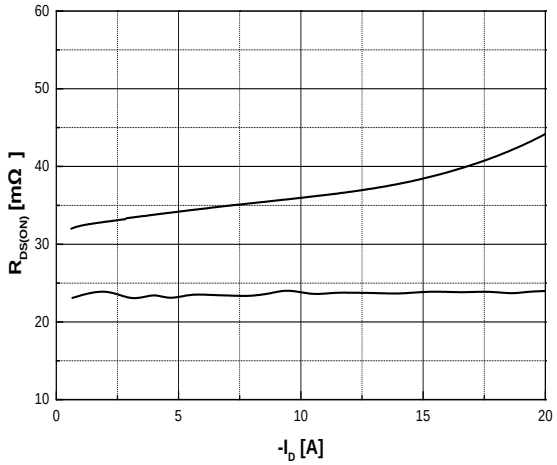


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

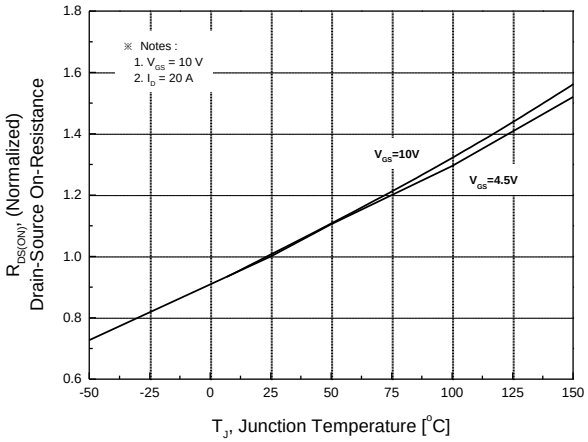


Fig.3 On-Resistance Variation with Temperature

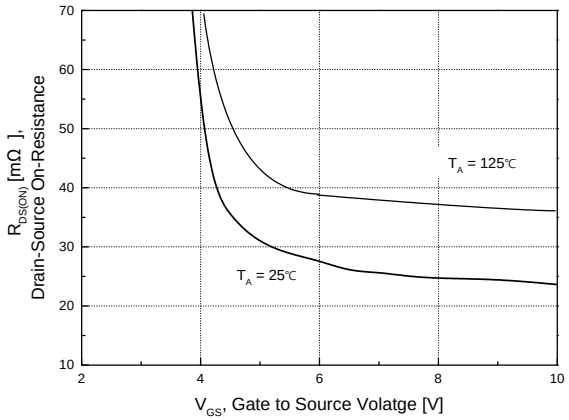


Fig.4 On-Resistance Variation with Gate to Source Voltage

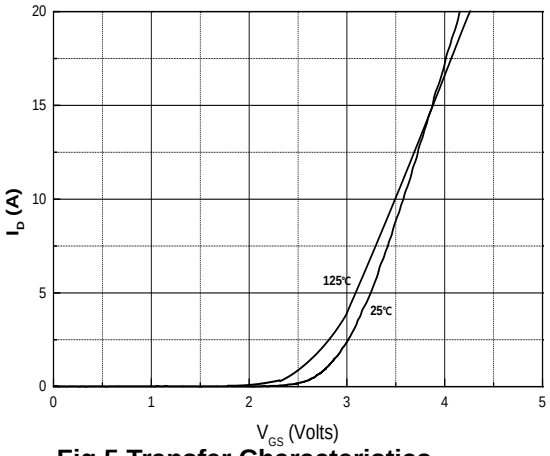


Fig.5 Transfer Characteristics

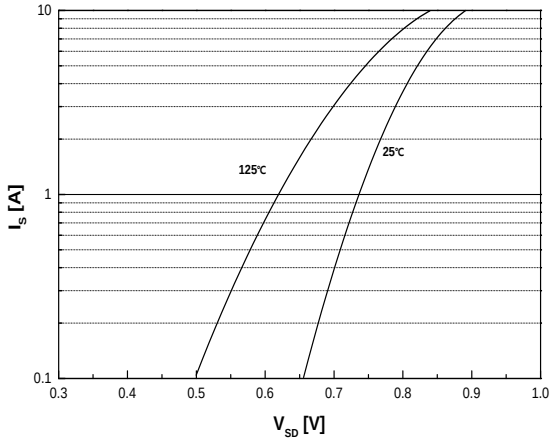


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

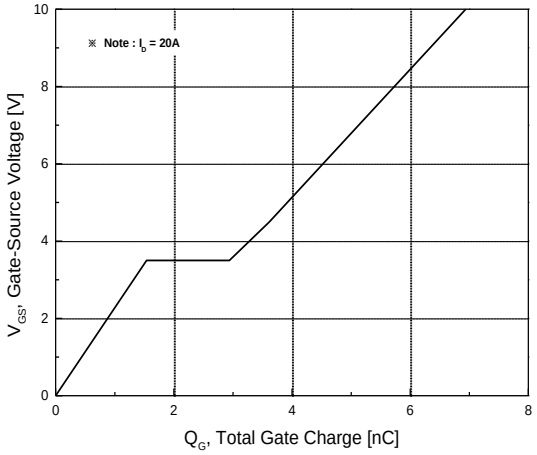


Fig.7 Gate Charge Characteristics

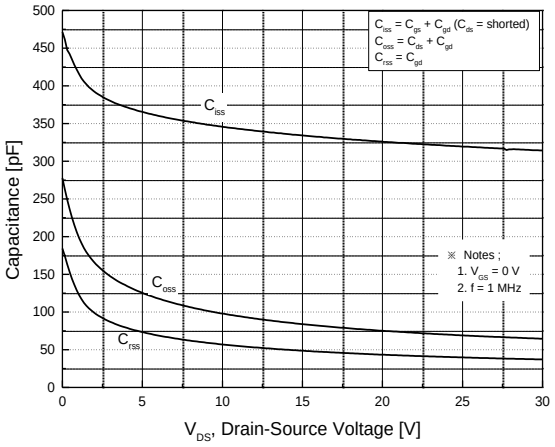


Fig.8 Capacitance Characteristics

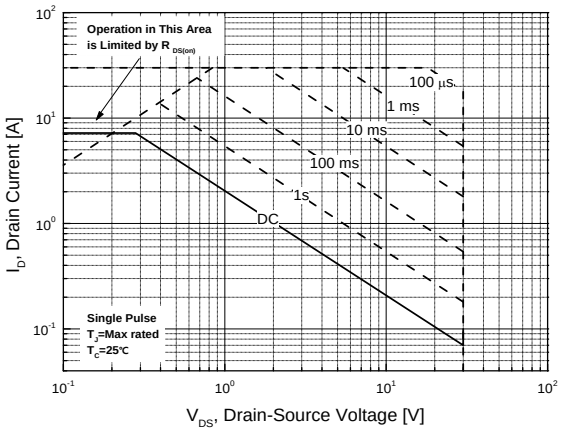


Fig.9 Maximum Safe Operating Area

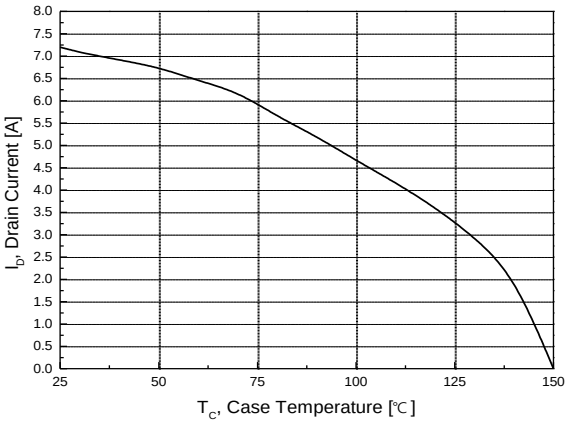


Fig.10 Maximum Drain Current vs. Case Temperature

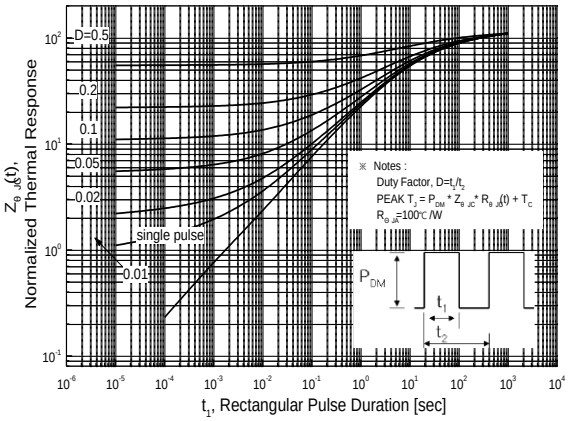
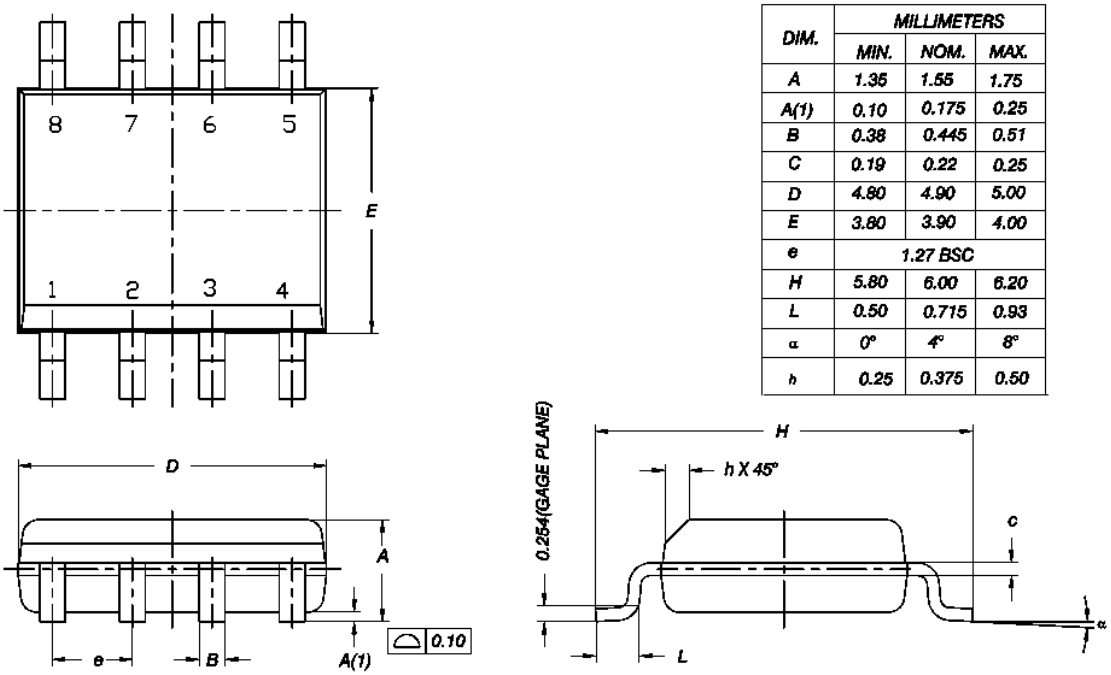


Fig.11 Transient Thermal Response Curve

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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