MDS3653

Single P-Channel Trench MOSFET, -30V, -13A, 7mΩ

General Description

The MDS3653 uses advanced Magnachip's MOSFET Technology to provide low on-state resistance.

This device is suited for Power Management and load switching applications common in Note PC Battery.

Features

- V_{DS} = -30V
- I_D = -13A @V_{GS} = -10V
- $R_{DS(ON)}$
  < 7mΩ @V_{GS} = -10V
  < 12mΩ @V_{GS} = -4V

Applications

- Load Switch
- General purpose applications
- Smart Module for Note PC Battery

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	(Note 1)	I_D	-13	A
Pulsed Drain Current		I_{DM}	-52	A
Power Dissipation		P_D	2.5	W
Single Pulse Avalanche Energy	(Note 2)	E_{AS}	180	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	°C

Thermal Characteristics

Characteristics		Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient	(Note 1)	$R_{\theta JA}$	50	°C/W
Thermal Resistance, Junction-to-Case		$R_{\theta JC}$	25	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDS3653URH	-55~150°C	SOIC-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	-0.8	-1.5	-2.0	
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 = -6.5A	-	5.8	7	mΩ
		V_{GS} = -4V, I_D = -6.5A	-	8.3	12	
Forward Transconductance	g_{FS}	V_{DS} = -10V, I_D = -6.5A		30	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = -15V, I_D = -13A V_{GS} = -10V	-	70	-	nC
Gate-Source Charge	Q_{gs}		-	8	-	
Gate-Drain Charge	Q_{gd}		-	15	-	
Input Capacitance	C_{iss}	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz	-	3000	-	pF
Reverse Transfer Capacitance	C_{rss}		-	454	-	
Output Capacitance	C_{oss}		-	740	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = -10V ,V_{DS} = -15V, R_L = 2.3Ω, R_{GEN} = 4.7Ω	-	12	-	ns
Turn-On Rise Time	t_r		-	15	-	
Turn-Off Delay Time	$t_{d(off)}$		-	100	-	
Turn-Off Fall Time	t_f		-	60	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = -13A, V_{GS} = 0V	-	-0.82	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = -13A, di/dt = 100A/μs	-	39.2		ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	52.5	-	nC

Note :

1. Surface mounted RF4 board with 2oz. Copper.
2. Starting T_J=25˚C, L=1mH, I_{AS}= -19A V_{DD}=-20V, 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. Ambient 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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