



Magnachip

Single P-Channel Trench MOSFET, -30V, -20A, 12.1mΩ

MDV3604

MDV3604—Single P-Channel Trench MOSFET

General Description

The MDV3604 uses advanced Magnachip's MOSFET Technology to provide low on-state resistance.

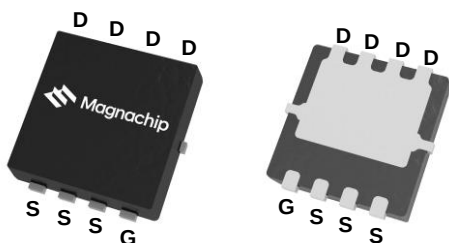
This device is suited for Power Management and load switching applications common in Notebook Computers and Portable Battery Packs.

Features

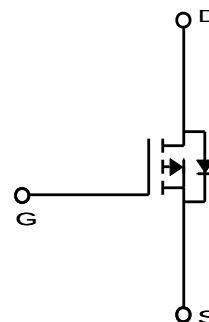
- $V_{DS} = -30V$
- $I_D = -20A$ @ $V_{GS} = -10V$
- $R_{DS(ON)}$
 - < 10.0mΩ @ $V_{GS} = -20V$
 - < 12.1mΩ @ $V_{GS} = -10V$
 - < 18.3mΩ @ $V_{GS} = -5V$

Applications

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



PDFN33



Absolute Maximum Ratings ($T_a = 25^\circ C$ unless otherwise noted)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	-30	V
Gate-Source Voltage		V_{GSS}	± 25	V
Continuous Drain Current ⁽¹⁾	$T_c = 25^\circ C$ (Package limited)	I_D	-20	A
	$T_c = 25^\circ C$ (Silicon limited)		-36.1	
	$T_A = 25^\circ C$		-12.6 ⁽³⁾	
Pulsed Drain Current		I_{DM}	-32	A
Power Dissipation	$T_c = 25^\circ C$	P_D	27.7	W
	$T_A = 25^\circ C$		3.4 ⁽³⁾	
Single Pulse Avalanche Energy ⁽²⁾		E_{AS}	84.5	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	$^\circ C$

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	36	$^\circ C/W$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.5	

Ordering Information

Part Number	Temp. Range	Package	Packing	Quantity	RoHS Status
MDV3604URH	-55~150°C	PowerDFN33	Tape & Reel	5000 units	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	-1.8	-3.0	
Drain Cut-Off Current	I _{DSS}	V _{DS} = -30V, V _{GS} = 0V	-		-1	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±25V, V _{DS} = 0V	-	-	±0.1	
Drain-Source ON Resistance	R _{DS(ON)}	V _{GS} = -20V, I _D = -12A	-	8.6	10	mΩ
		V _{GS} = -10V, I _D = -12A	-	10	12.1	
		V _{GS} = -5V, I _D = -10A		14.6	18.3	
Forward Transconductance	g _{FS}	V _{DS} = -5V, I _D = -10A		25.5	-	S
Dynamic Characteristics						
Total Gate Charge	Q _g	V _{DS} = -15V, I _D = -12A V _{GS} = -10V	-	30.5	-	nC
Gate-Source Charge	Q _{gs}		-	5.2	-	
Gate-Drain Charge	Q _{gd}		-	7.0	-	
Input Capacitance	C _{iss}	V _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz	-	1433	-	pF
Reverse Transfer Capacitance	C _{rss}		-	212	-	
Output Capacitance	C _{oss}		-	338	-	
Turn-On Delay Time	t _{d(on)}	V _{GS} = -10V, V _{DS} = -15V, R _L = 1.25Ω, R _{GEN} = 3Ω	-	15.2	-	ns
Turn-On Rise Time	t _r		-	12.9	-	
Turn-Off Delay Time	t _{d(off)}		-	50.6	-	
Turn-Off Fall Time	t _f		-	34.6	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V _{SD}	I _S = -1A, V _{GS} = 0V	-	-0.71	-1.0	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = -12A, di/dt = 100A/μs	-	38.5		ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	35.9	-	nC

Note :

1. Surface mounted FR-4 board by JEDEC (jesd51-7)
2. Starting T_J=25°C, L=1mH, I_{AS}= -13A V_{DD}=-20V, V_{GS}=-10V.
3. T < 10sec

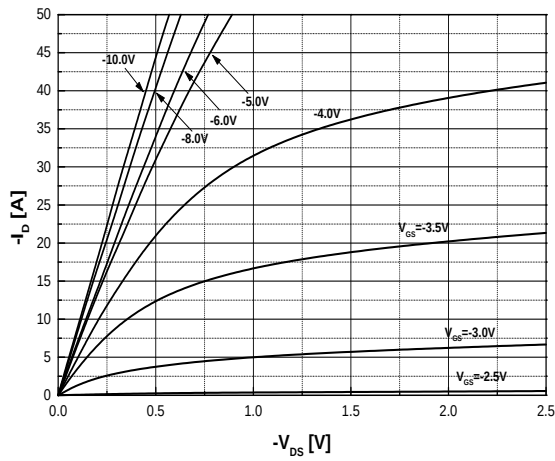


Fig.1 On-Region Characteristics

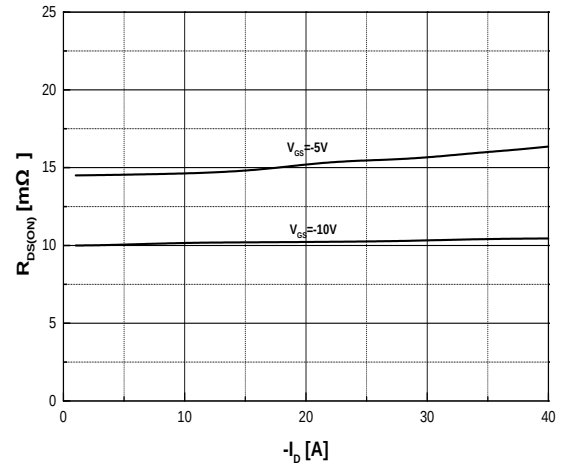


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

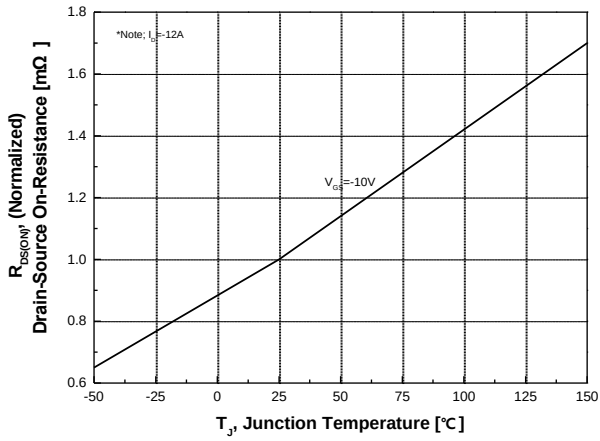


Fig.3 On-Resistance Variation with Temperature

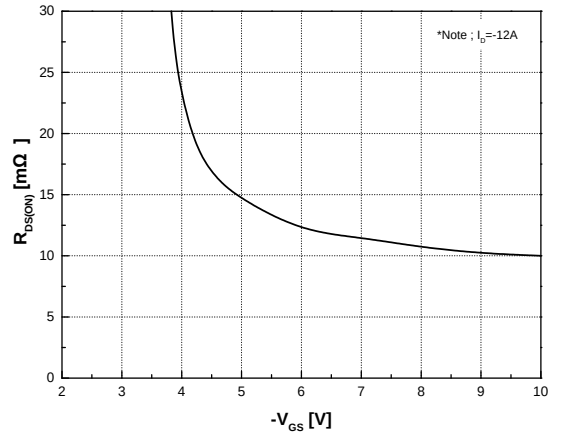


Fig.4 On-Resistance Variation with Gate to Source Voltage

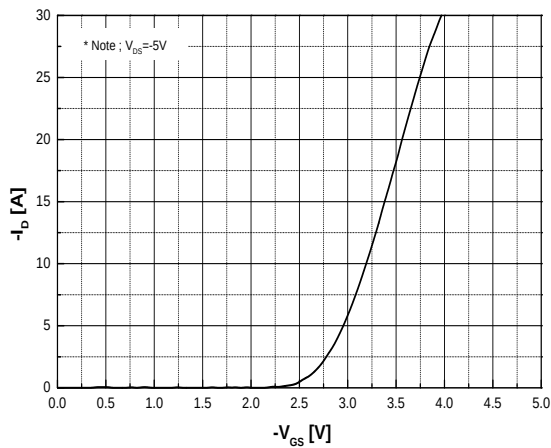


Fig.5 Transfer Characteristics

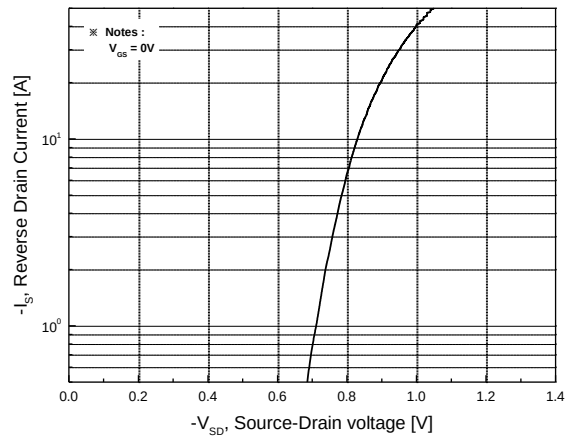


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

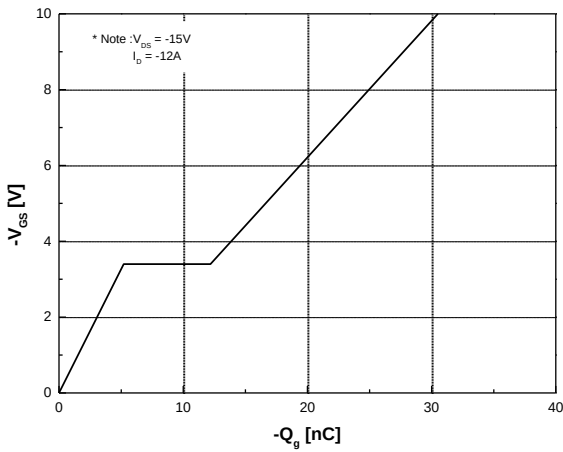


Fig.7 Gate Charge Characteristics

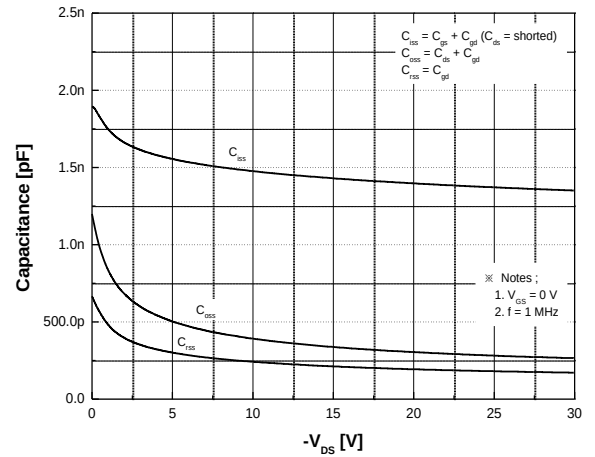


Fig.8 Capacitance Characteristics

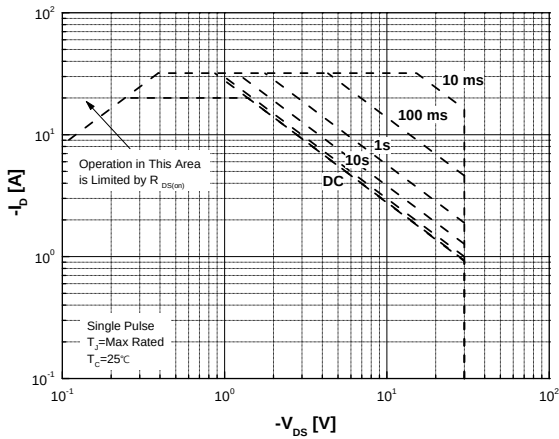


Fig.9 Maximum Safe Operating Area

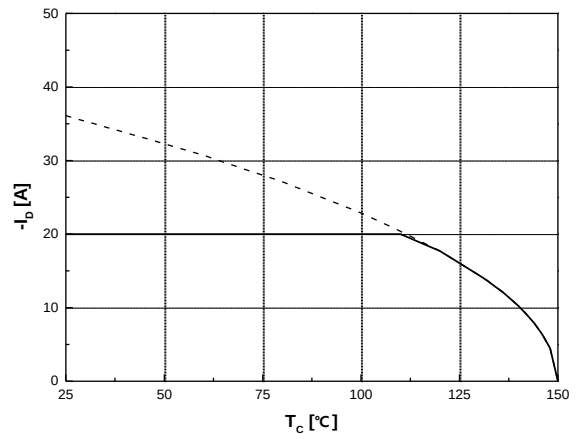


Fig.10 Maximum Drain Current vs. Ambient Temperature

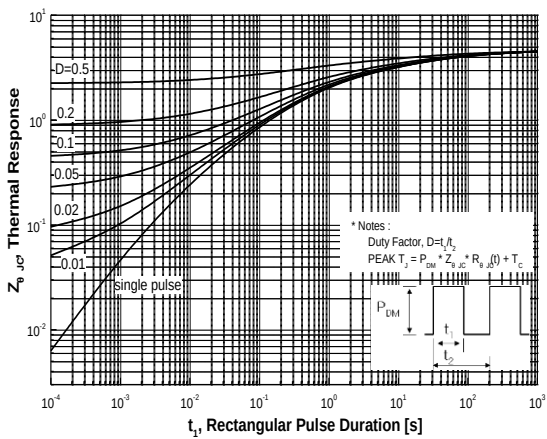
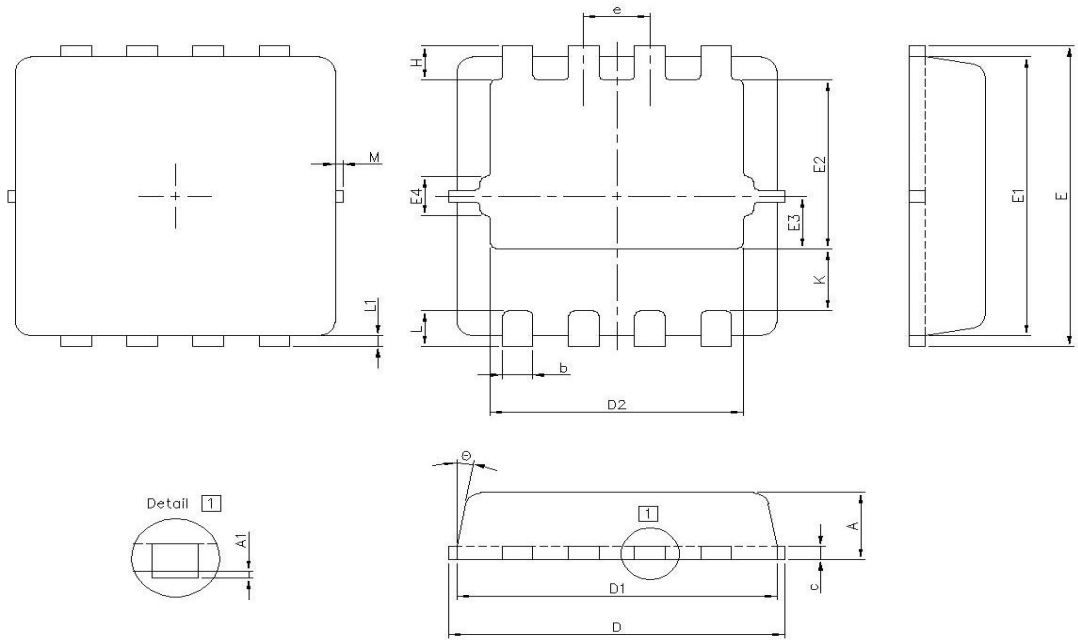


Fig.11 Transient Thermal Response Curve

Package Dimension

PowerDFN33 (3.3x3.3mm)

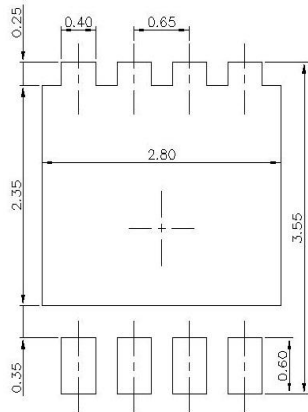
Dimensions are in millimeters, unless otherwise specified



(Unit: mm)

DIM	Min	Max	DIM	Min	Max
A	0.70	0.80	E2	1.78	1.98
A1	0.00	0.05	E3	0.49	0.69
b	0.25	0.35	E4	0.35 TYP.	
c	0.10	0.25	e	0.65 BSC	
D	3.20	3.40	K	0.70 TYP.	
D1	3.00	3.20	L	0.30	0.50
D2	2.39	2.59	L1	0.13 TYP.	
E	3.25	3.45	H	0.27	0.47
E1	3.00	3.20	Θ	0	12

Land Pattern
(Only for Reference)



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