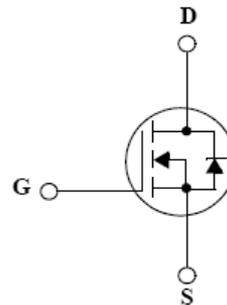
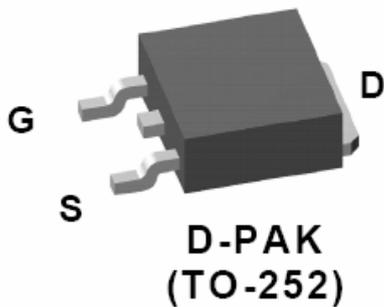


**General Description**

The MDD1653 uses advanced Magnachip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance and excellent quality. MDD1653 is suitable device for PWM, Load Switching and general purpose applications.

**Features**

- $V_{DS} = 30V$
- $I_D = 50A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} < 8.5m\Omega$  @  $V_{GS} = 10V$   
 $< 14.0m\Omega$  @  $V_{GS} = 4.5V$



**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 <sup>(1)</sup>	$T_C=25^\circ C$	$I_D$	50	A
	$T_C=100^\circ C$		50	A
Pulsed Drain Current		$I_{DM}$	150	A
Power Dissipation	$T_C=25^\circ C$	$P_D$	50	W
	$T_C=100^\circ C$		25	
Power Dissipation	$T_A=25^\circ C$	$P_{DSM}$	3	W
	$T_A=70^\circ C$		2.1	
Single Pulse Avalanche Energy <sup>(2)</sup>		$E_{AS}$	100	mJ
Junction and Storage Temperature Range		$T_J, T_{stg}$	-55~150	°C

**Thermal Characteristics**

Characteristics		Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient <sup>(1)</sup>		$R_{\theta JA}$	45	°C/W
Thermal Resistance, Junction-to-Case		$R_{\theta JC}$	2.5	

**Ordering Information**

Part Number	Temp. Range	Package	Packing	RoHS Status
MDD1653T	-55~150°C	D-PAK	Tube	Halogen Free
MDD1653R	-55~150°C	D-PAK	Tape & Reel	Halogen Free

**Electrical Characteristics (Ta =25°C)**

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	30	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.9	3	
Drain Cut-Off Current	$I_{DSS}$	$V_{DS} = 24V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 0.1$	
Drain-Source ON Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 30A$	-	7.5	8.5	m $\Omega$
		$V_{GS} = 4.5V, I_D = 20A$	-	11.5	14	
		$V_{GS} = -2.5V, I_D = -6.9A$	-	-	-	
On-State Drain Current	$I_{D(on)}$	$V_{DS} = 5V, V_{GS} = 10V$	100	-	-	A
Forward Transconductance	$g_{fs}$	$V_{DS} = 5V, I_D = 10A$	-	35	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	$Q_{g(10V)}$	$V_{DS} = 12.5V, I_D = 20A, V_{GS} = 10V$	-	17.6	-	nC
Total Gate Charge	$Q_{g(4.5V)}$		-	9.2	-	
Gate-Source Charge	$Q_{gs}$		-	3.0	-	
Gate-Drain Charge	$Q_{gd}$		-	3.8	-	
Input Capacitance	$C_{iss}$	$V_{DS} = 12.5V, V_{GS} = 0V, f = 1.0MHz$	-	900	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	135	-	
Output Capacitance	$C_{oss}$		-	260	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 12.5V, R_L = 0.6\Omega, R_G = 3\Omega$	-	6.2	-	ns
Rise Time	$t_r$		-	21.8	-	
Trun-Off Delay Time	$t_{d(off)}$		-	17.6	-	
Fall Time	$t_f$		-	10.6	-	
<b>Drain-Source Body Diode Characteristics</b>						
Source-Drain Diode Forward Voltage	$V_{SD}$	$I_S = 1A, V_{GS} = 0V$	-	0.71	-	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 20A, di/dt = 100A/\mu s$	-	25.0	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	14.0	-	nC

Note :

1. Surface mounted RF4 board with 2oz. Copper.
2. Starting TJ = 25°C, L = 1mH, IAS = 10A, VDD = 15V, VGS = 10V.

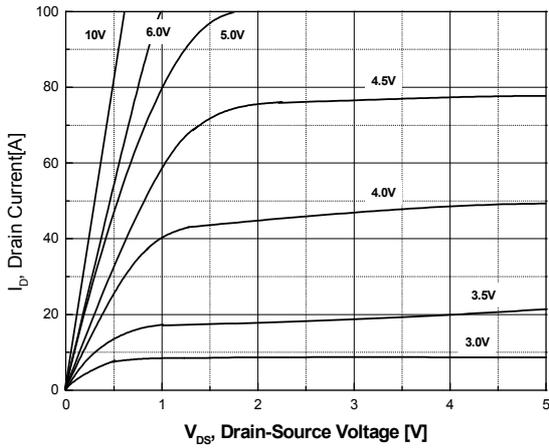


Fig.1 On-Region Characteristics

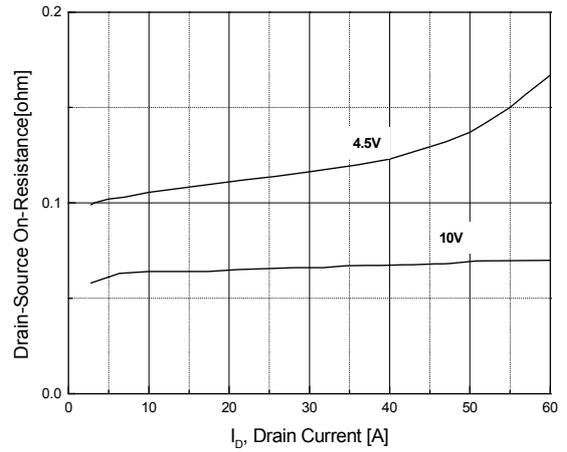


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

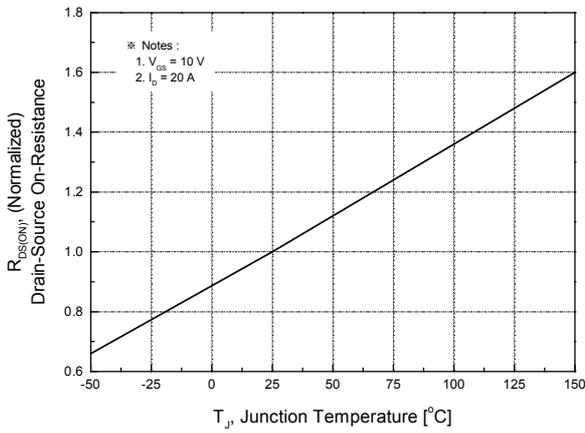


Fig.3 On-Resistance Variation with Temperature

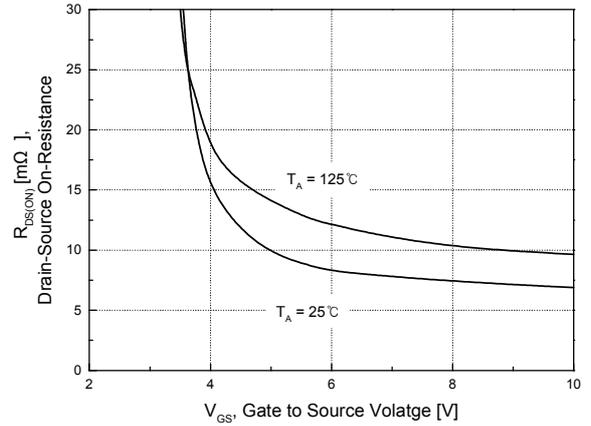


Fig.4 On-Resistance Variation with Gate to Source Voltage

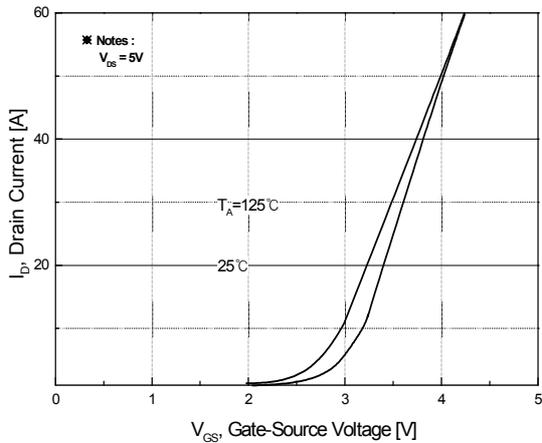


Fig.5 Transfer Characteristics

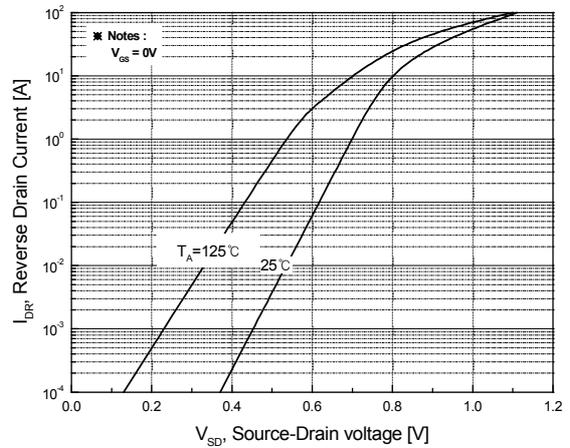


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

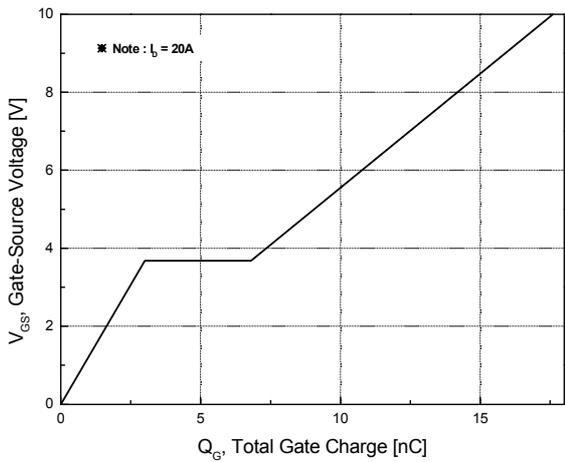


Fig.7 Gate Charge Characteristics

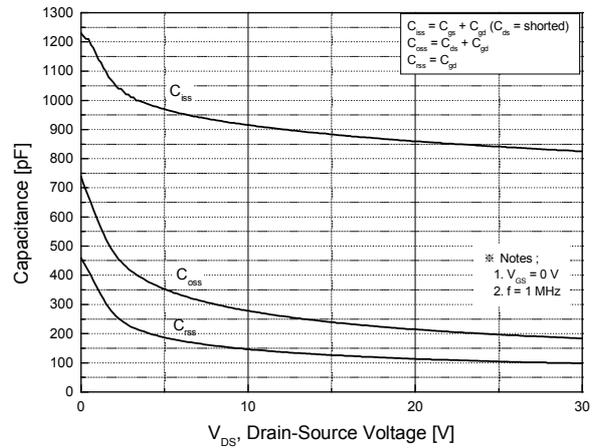


Fig.8 Capacitance Characteristics

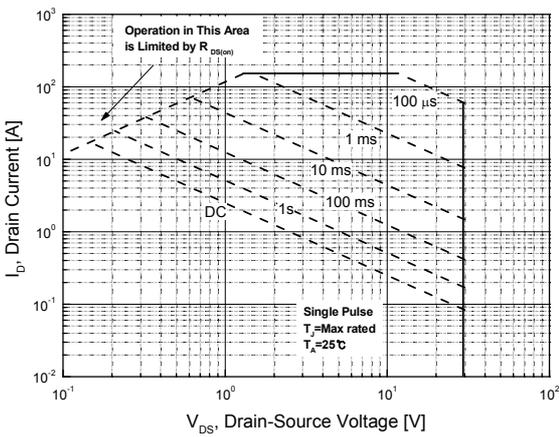


Fig.9 Maximum Safe Operating Area

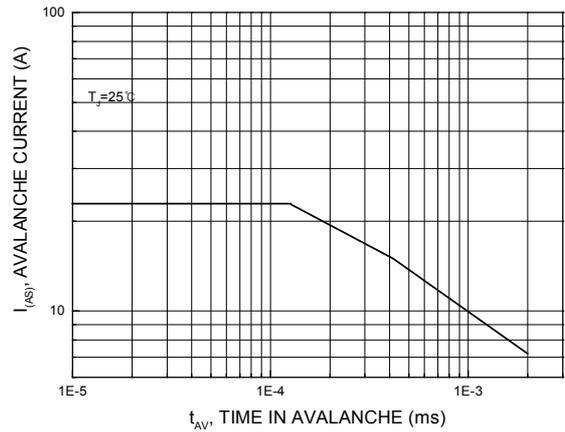


Fig.10 Unclamped Inductive Switching Capability

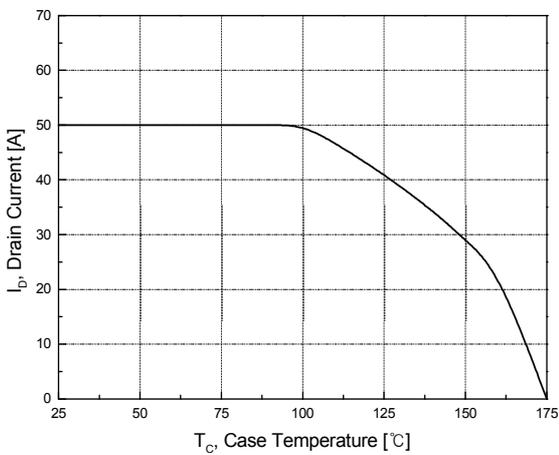


Fig.11 Maximum Drain Current Vs. Case Temperature

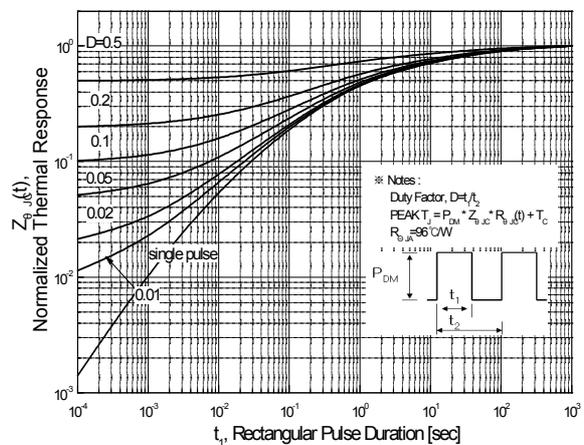


Fig.12 Transient Thermal Response Curve

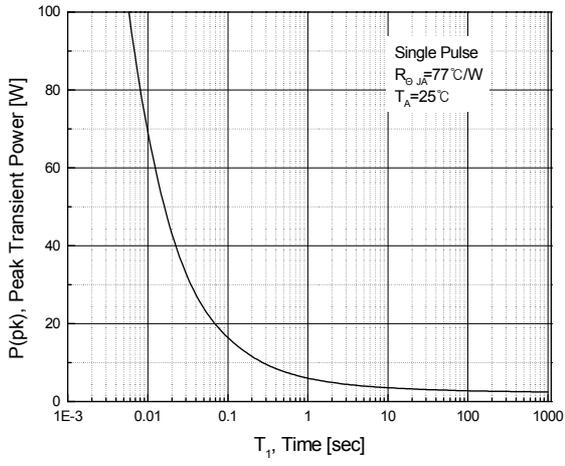


Fig13. Single Pulse Maximum Power Dissipation

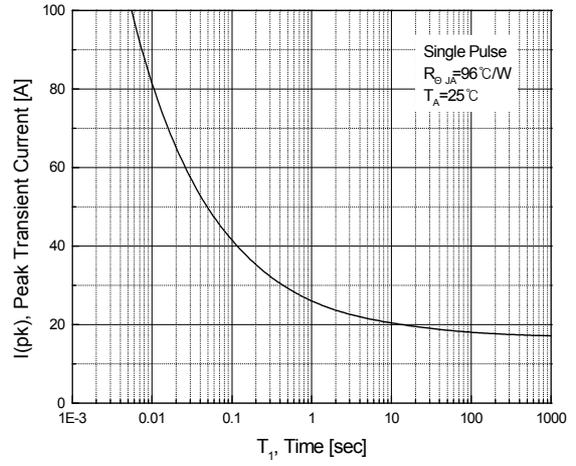
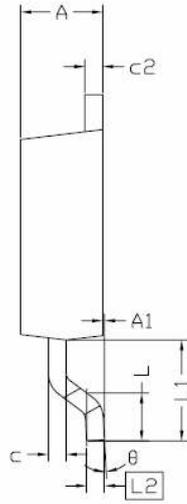
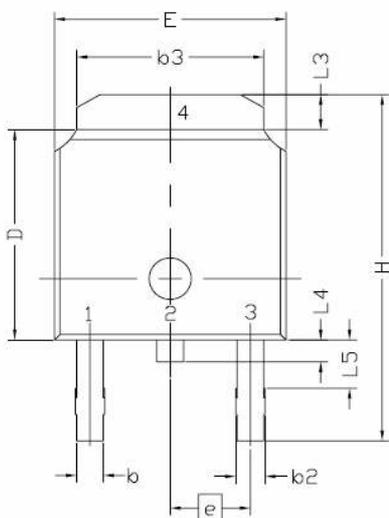
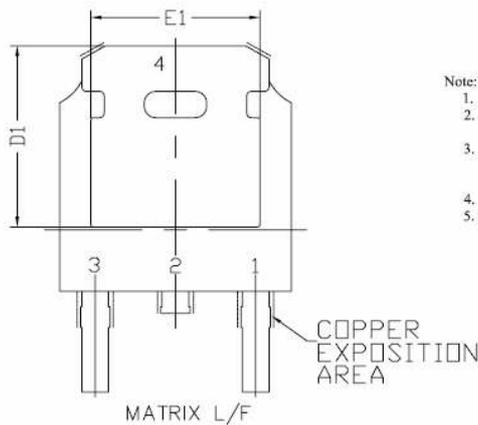
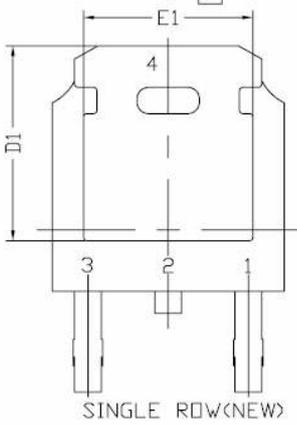


Fig14. Single Pulse Maximum Peak Current

**Package Dimension**



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NDM	MAX
E	6.40	6.60	6.731
L	1.40	1.52	1.77
L1	2.743 REF		
L2	0.508 BSC		
L3	0.89	--	1.27
L4	0.64	--	1.01
L5	--	--	--
D	6.00	6.10	6.223
H	9.40	10.00	10.40
b	0.64	0.76	0.88
b2	0.77	0.84	1.14
b3	5.21	5.34	5.46
e	2.286 BSC		
A	2.20	2.30	2.38
A1	0	--	0.127
c	0.45	0.50	0.60
c2	0.45	0.50	0.58
D1	5.30	--	--
E1	4.40	--	--
θ	0°	--	10°



- Note:
1. All Dimension Are In mm.
  2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs. Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
  3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
  4. The Package Top May Be Smaller Than The Package Bottom.
  5. Dimension "b" Does Not Include Dambar Protrusion. Allowable Dambar Protrusion Shall Be 0.10 mm Total In Excess Of "b" Dimension At Maximum Material Condition. The Dambar Cannot Be Located On The Lower Radius Of The Foot.

## Worldwide Sales Support Locations

### U.S.A

#### Sunnyvale Office

787 N. Mary Ave. Sunnyvale  
CA 94085 U.S.A  
Tel : 1-408-636-5200  
Fax : 1-408-213-2450  
E-Mail : americasales@magnachip.com

#### Chicago Office

2300 Barrington Road, Suite 330  
Hoffman Estates, IL 60195 U.S.A  
Tel : 1-847-882-0951  
Fax : 1-847-882-0998

### U.K

Knyvett House The Causeway,  
Staines Middx, TW18 3BA, U.K.  
Tel : +44 (0) 1784-898-8000  
Fax : +44 (0) 1784-895-115  
E-Mail : europesales@magnachip.com

### Japan

#### Tokyo Office

Shinbashi 2-chome MT bldg  
4F 2-5-5 Shinbashi, Minato-ku  
Tokyo, 105-0004 Japan  
Tel : 81-3-3595-0632  
Fax : 81-3-3595-0671  
E-Mail : japansales@magnachip.com

#### Osaka Office

3F, Shin-Osaka MT-2 Bldg  
3-5-36 Miyahara Yodogawa-Ku  
Osaka, 532-0003 Japan  
Tel : 81-6-6394-8224  
Fax : 81-6-6394-8282  
E-Mail : osakasales@magnachip.com

### Taiwan R.O.C

2F, No.61, Chowize Street, Nei Hu  
Taipei, 114 Taiwan R.O.C  
Tel : 886-2-2657-7898  
Fax : 886-2-2657-8751  
E-Mail : taiwansales@magnachip.com

### China

#### Hong Kong Office

Office 03, 42/F, Office Tower Convention Plaza  
1 Harbour Road, Wanchai, Hong Kong  
Tel : 852-2828-9700  
Fax : 852-2802-8183  
E-Mail : chinasales@magnachip.com

#### Shenzhen Office

Room 1803, 18/F  
International Chamber of Commerce Tower  
Fuhua 3Road, Futian District  
ShenZhen, China  
Tel : 86-755-8831-5561  
Fax : 86-755-8831-5565

#### Shanghai Office

Ste 1902, 1 Huaihai Rd. (C) 20021  
Shanghai, China  
Tel : 86-21-6373-5181  
Fax : 86-21-6373-6640

### Korea

891, Daechi-Dong, Kangnam-Gu  
Seoul, 135-738 Korea  
Tel : 82-2-6903-3451  
Fax : 82-2-6903-3668 ~9  
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