RoHS Compliant
HALOGEN-FREE

MagnaChip

MDD1653

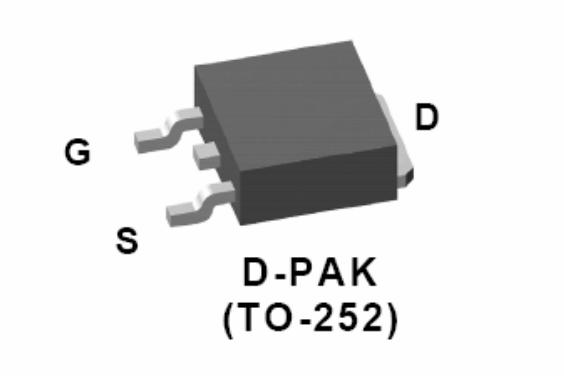
30V N-channel Trench MOSFET : 30V, 50A, 8.5mΩ

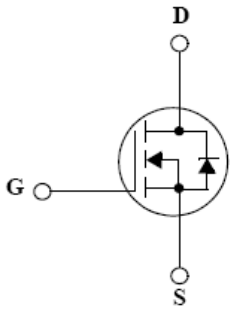
General Description

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
- $R_{DS(ON)}$
  < 8.5mΩ @V_{GS} = 10V
  < 14.0mΩ @V_{GS} = 4.5V





Absoloute Maximun 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 (1)	T_C=25°C	I_D	50	A
	T_C=100°C		50	A
Pulsed Drain Current		I_{DM}	150	A
Power Dissipation	T_C=25°C	P_D	50	W
	T_C=100°C		25	
Power Dissipation	T_A=25°C	P_{DSM}	3	W
	T_A=70°C		2.1	
Single Pulse Avalanche Energy (2)		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 (1)	$R_{\theta JA}$	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
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	
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 = 30A	-	7.5	8.5	mΩ
		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
Dynamic Characteristics						
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 = 0.6Ω, R_G = 3Ω	-	6.2	-	ns
Rise Time	t_r		-	21.8	-	
Trun-Off Delay Time	$t_{d(off)}$		-	17.6	-	
Fall Time	t_f		-	10.6	-	
Drain-Source Body Diode Characteristics						
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/μs	-	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.

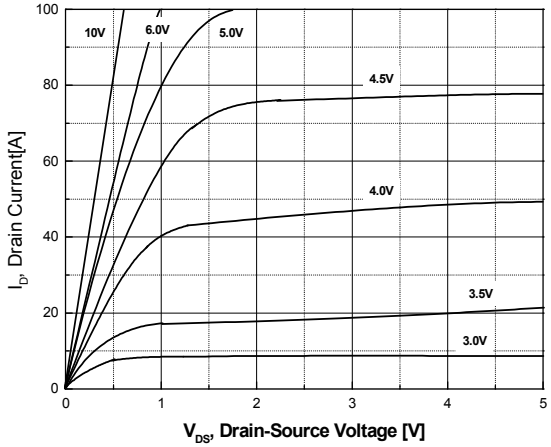


Fig.1 On-Region Characteristics

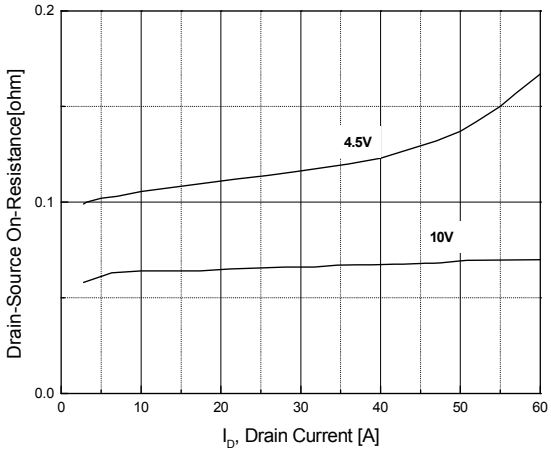


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

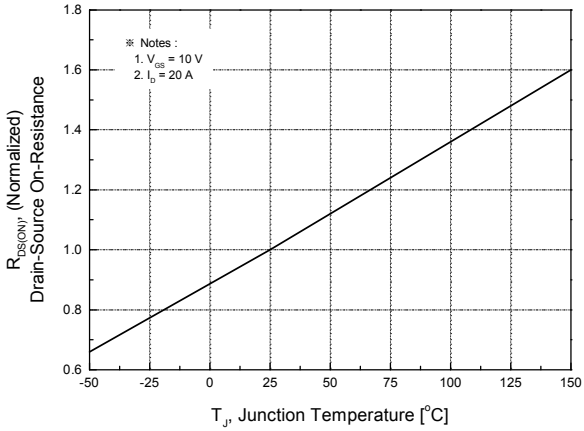


Fig.3 On-Resistance Variation with Temperature

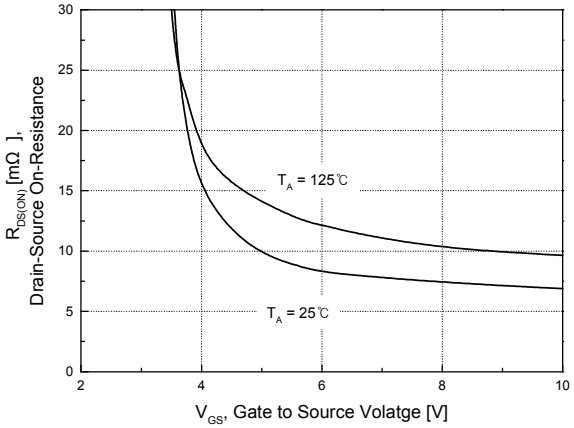


Fig.4 On-Resistance Variation with Gate to Source Voltage

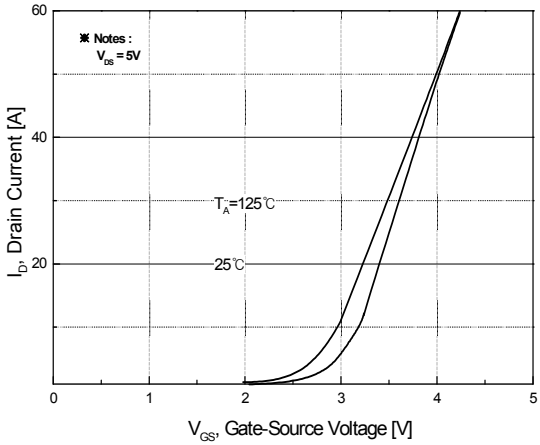


Fig.5 Transfer Characteristics

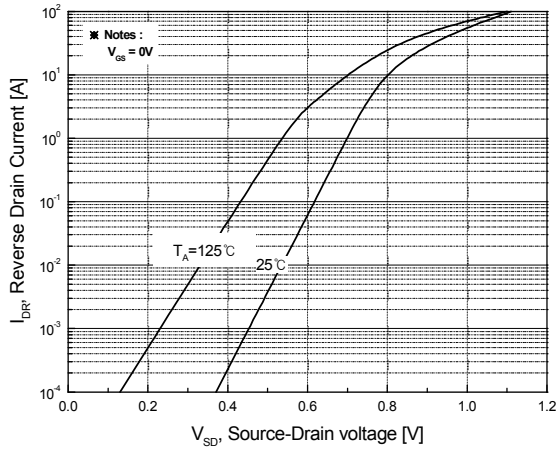


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

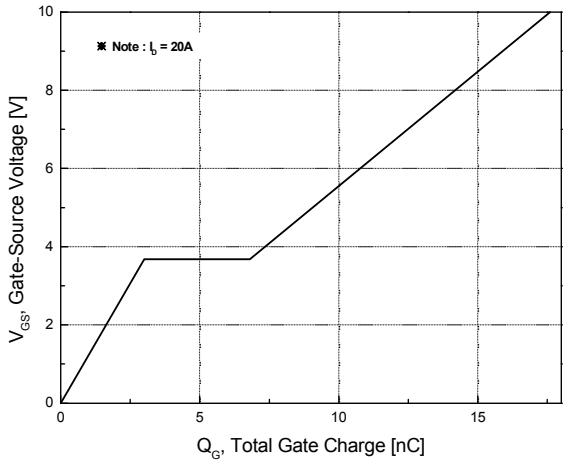


Fig.7 Gate Charge Characteristics

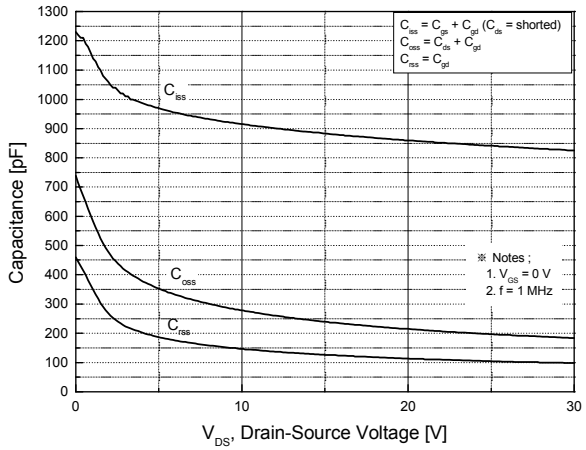


Fig.8 Capacitance Characteristics

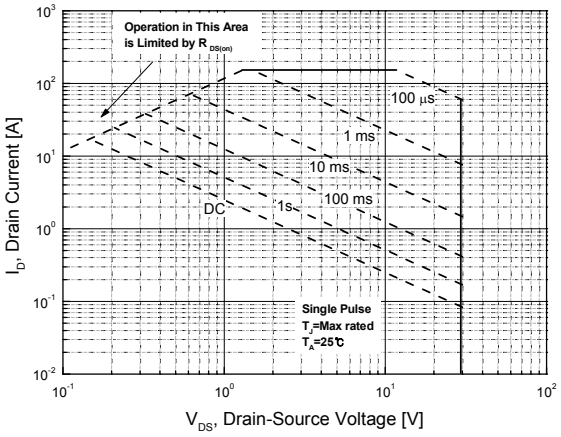


Fig.9 Maximum Safe Operating Area

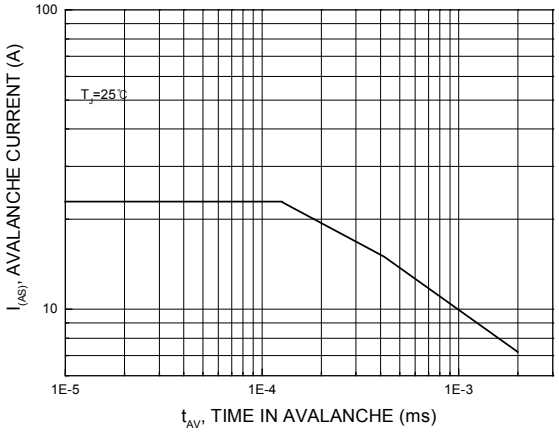


Fig.10 Unclamped Inductive Switching Capability

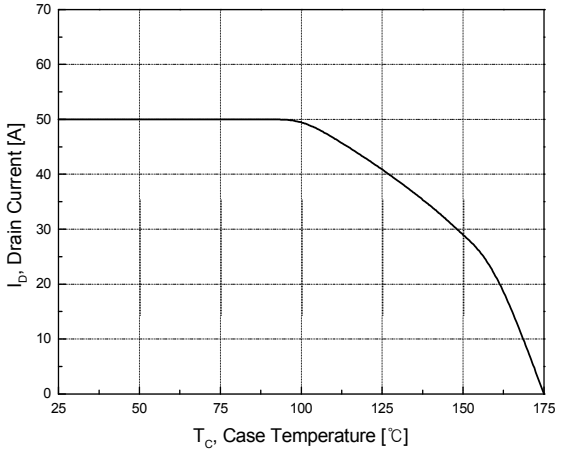


Fig.11 Maximum Drain Current Vs. Case Temperature

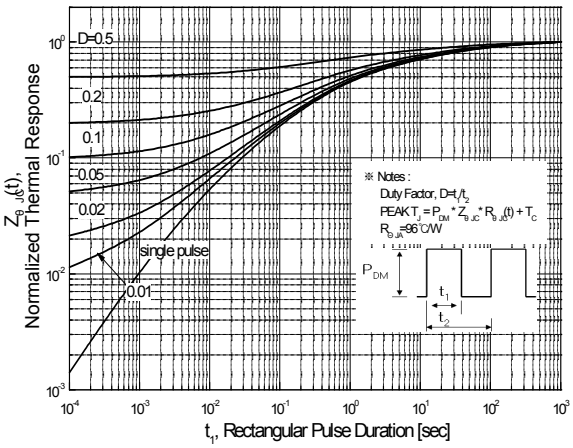


Fig.12 Transient Thermal Response Curve

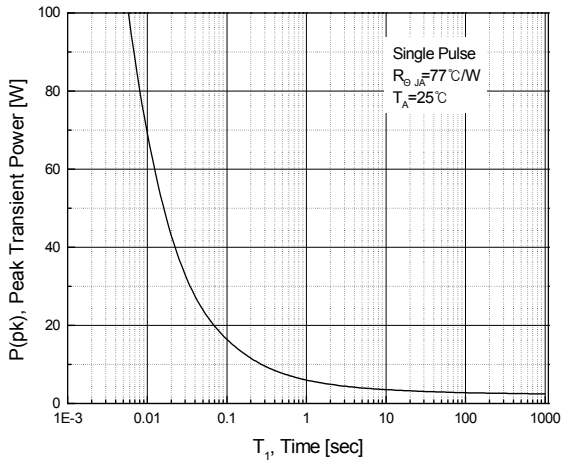


Fig13. Single Pulse Maximum Power Dissipation

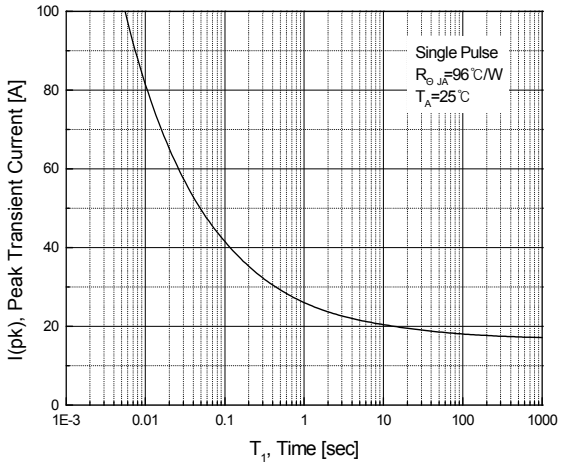
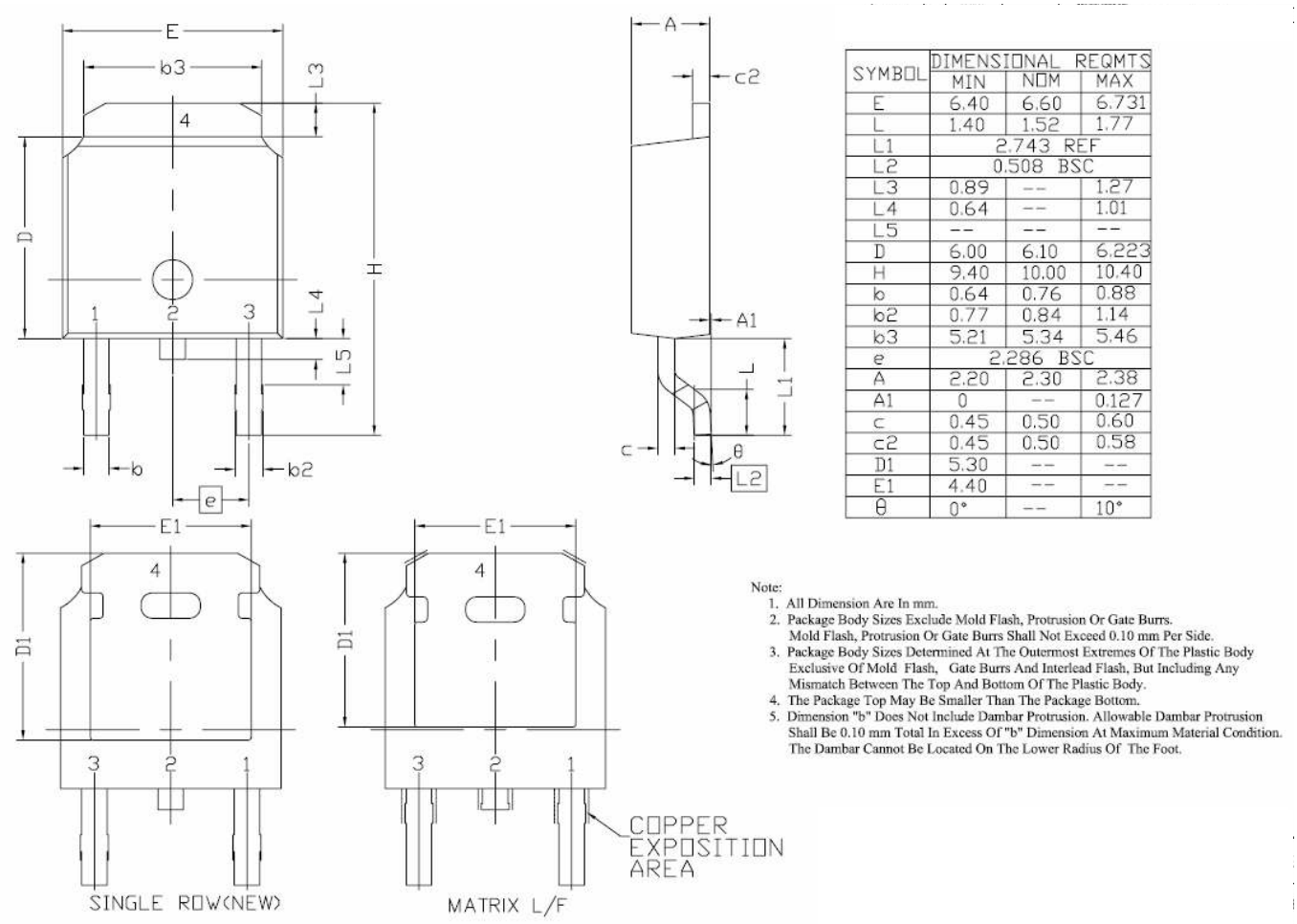


Fig14. Single Pulse Maximum Peak Current

Package Dimension



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	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.

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