RoHS Compliant
HALOGEN-FREE

MagnaChip

MDC0531E

Common-Drain N-Channel Trench MOSFET 30V, 8.0 A, 20mΩ

General Description

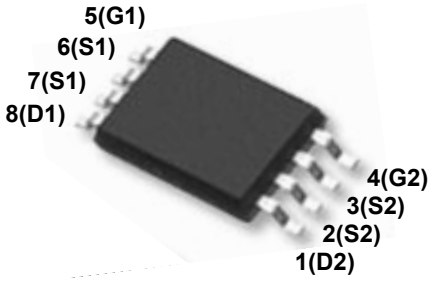
The MDC0531E uses advanced MagnaChip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent reliability. Low $R_{DS(ON)}$ and low gate charge operation with gate voltage as low as 2.5V

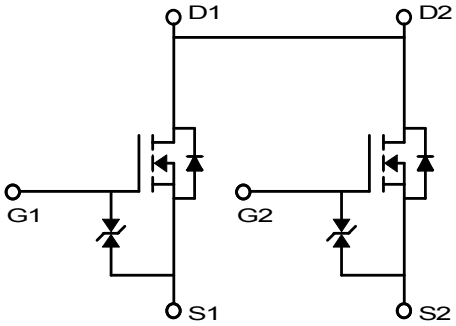
Features

- V_{DS} = 30V
- I_D = 8.0A @V_{GS} = 10V
- $R_{DS(ON)}$
  - < 20mΩ @V_{GS} = 10V
  - < 23mΩ @V_{GS} = 4.5V
  - < 32mΩ @V_{GS} = 2.5V

Applications

- Unidirectional or Bi-directional Load Switch
- Lithium-Ion Battery Packs
- Portable Battery Protection Module





Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±12	V
Continuous Drain Current	T_C=25°C	I_D	8	A
	T_C=70°C		6.5	A
Pulsed Drain Current		I_{DM}	45	A
Power Dissipation(1)	T_A=25°C	P_D	1.7	W
	T_A=70°C		1.0	
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	°C

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient(1)	$R_{\theta JA}$	75	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	6	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDC0531ET	-55~150°C	TSSOP-8	Tube	Halogen Free
MDC0531ER	-55~150°C	TSSOP-8	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	0.6	0.85	1.5	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 24V, V_{GS} = 0V	-	-	1	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±10V, V_{DS} = 0V	-	-	10	μA
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 5.0A		17	20	mΩ
		V_{GS} = 4.5V, I_D = 5.0A	-	19	23	
		V_{GS} = 2.5V, I_D = 3.0A	-	24	32	
Forward Transconductance	g_{fs}	V_{DS} = 5V, I_D = 7A	-	33	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = 15V, I_D = 5A, V_{GS} = 4.5V	-	10.7		nC
Gate-Source Charge	Q_{gs}		-	2.1		
Gate-Drain Charge	Q_{gd}		-	4.3		
Input Capacitance	C_{iss}	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz	-	870		pF
Reverse Transfer Capacitance	C_{rss}		-	105		
Output Capacitance	C_{oss}		-	115		
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 15V, R_L = 1.25Ω, R_G = 3Ω	-	3.5		ns
Rise Time	t_r		-	11		
Turn-Off Delay Time	$t_{d(off)}$		-	27		
Fall Time	t_f		-	6.5		
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V	0.5	0.71	0.9	V
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 4.5A, V_{GS} = 0V	-		1.0	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 11.6A, dI/dt = 100A/μs	-	24		ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	13		nC

Note :

1. Surface mounted RF4 board with 2oz. Copper.

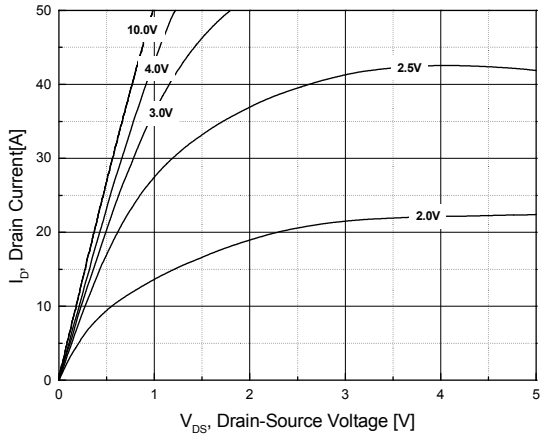


Fig.1 On-Region Characteristics

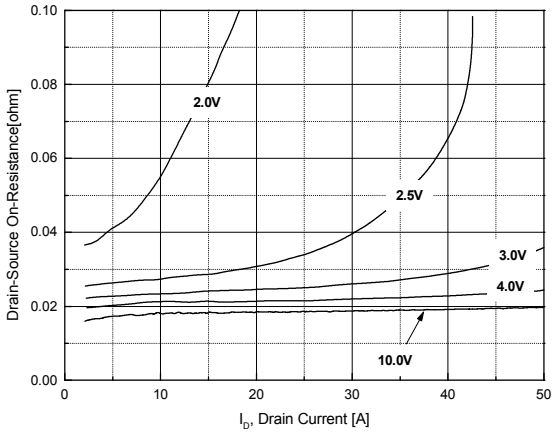


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

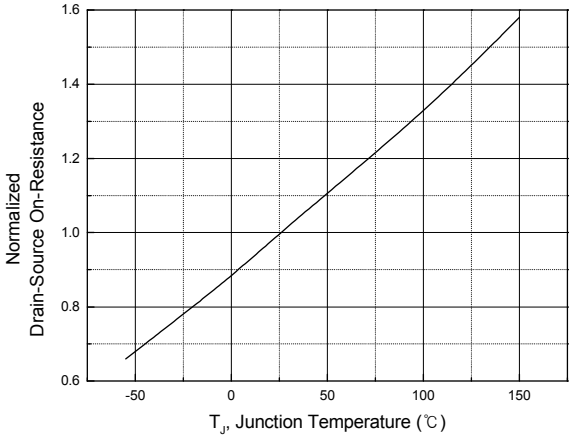


Fig.3 On-Resistance Variation with Temperature

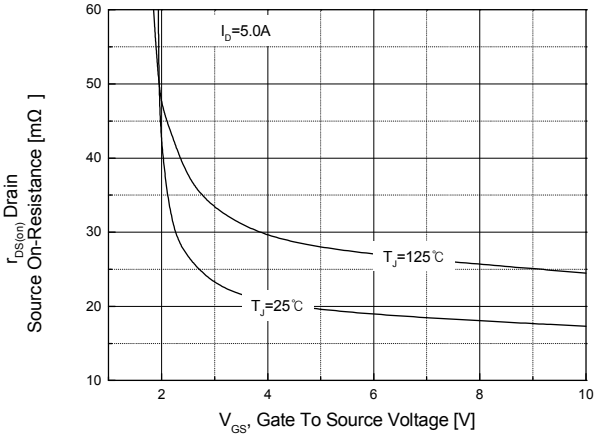


Fig.4 On-Resistance Variation with Gate to Source Voltage

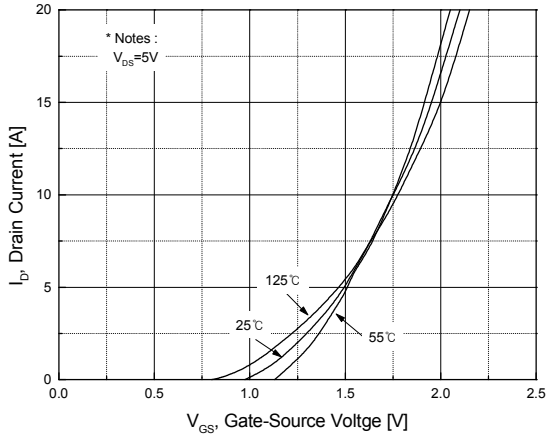


Fig.5 Transfer Characteristics

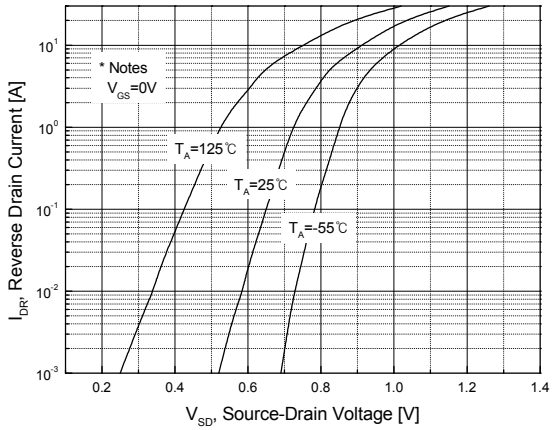


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

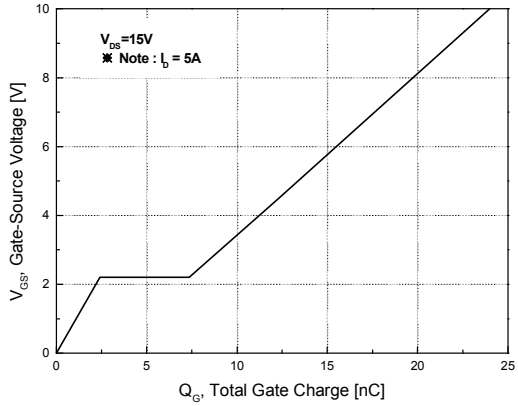


Fig.7 Gate Charge Characteristics

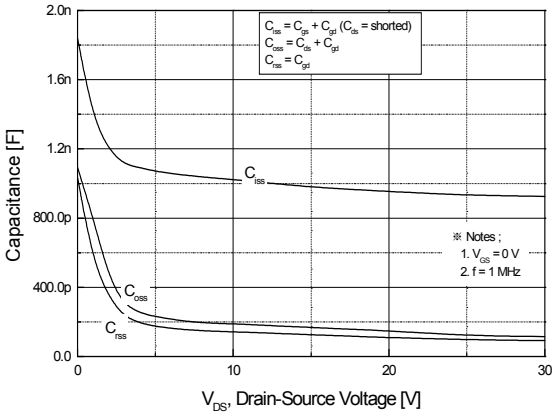


Fig.8 Capacitance Characteristics

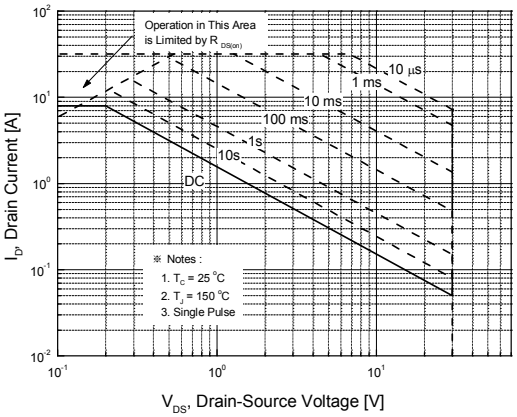


Fig.9 Maximum Safe Operating Area

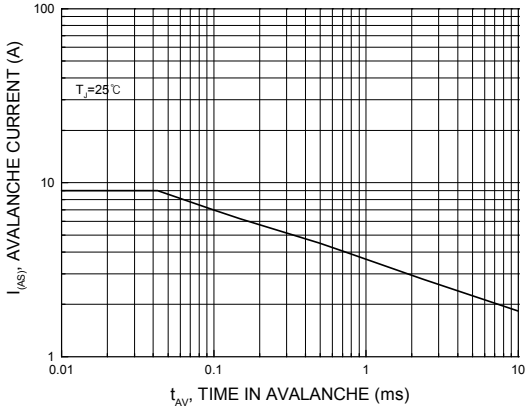


Fig.10 Unclamped Inductive Switching Capability

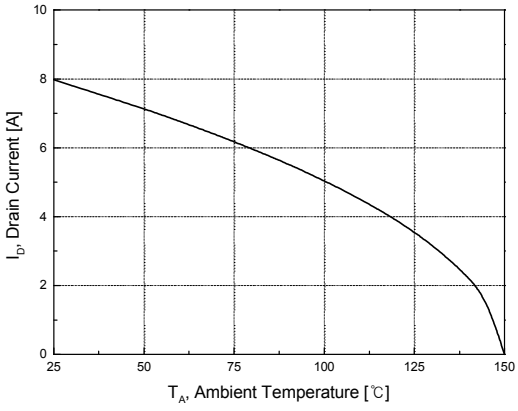


Fig.11 Maximum Drain Current vs. Case Temperature

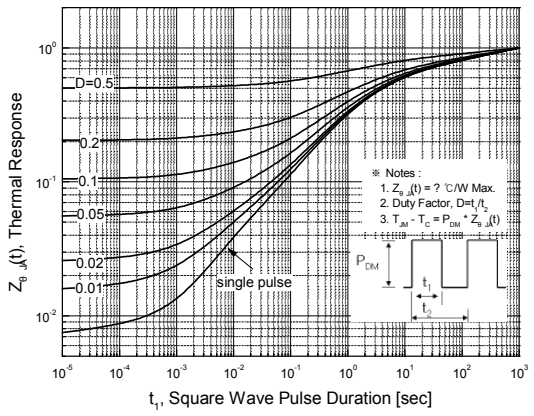


Fig.12 Transient Thermal Response Curve

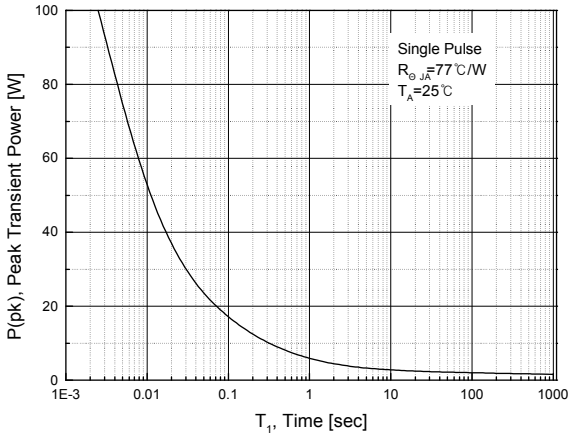


Fig13. Single Pulse Maximum Power Dissipation

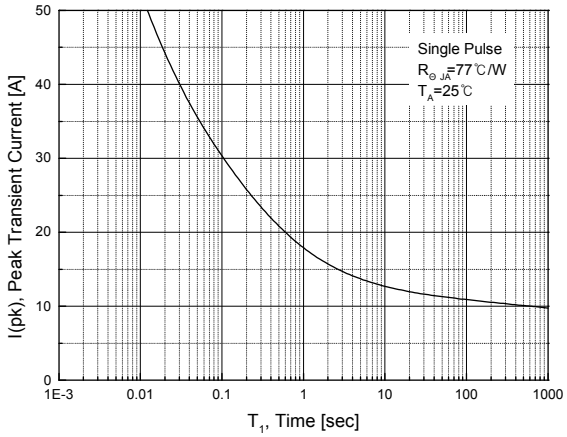
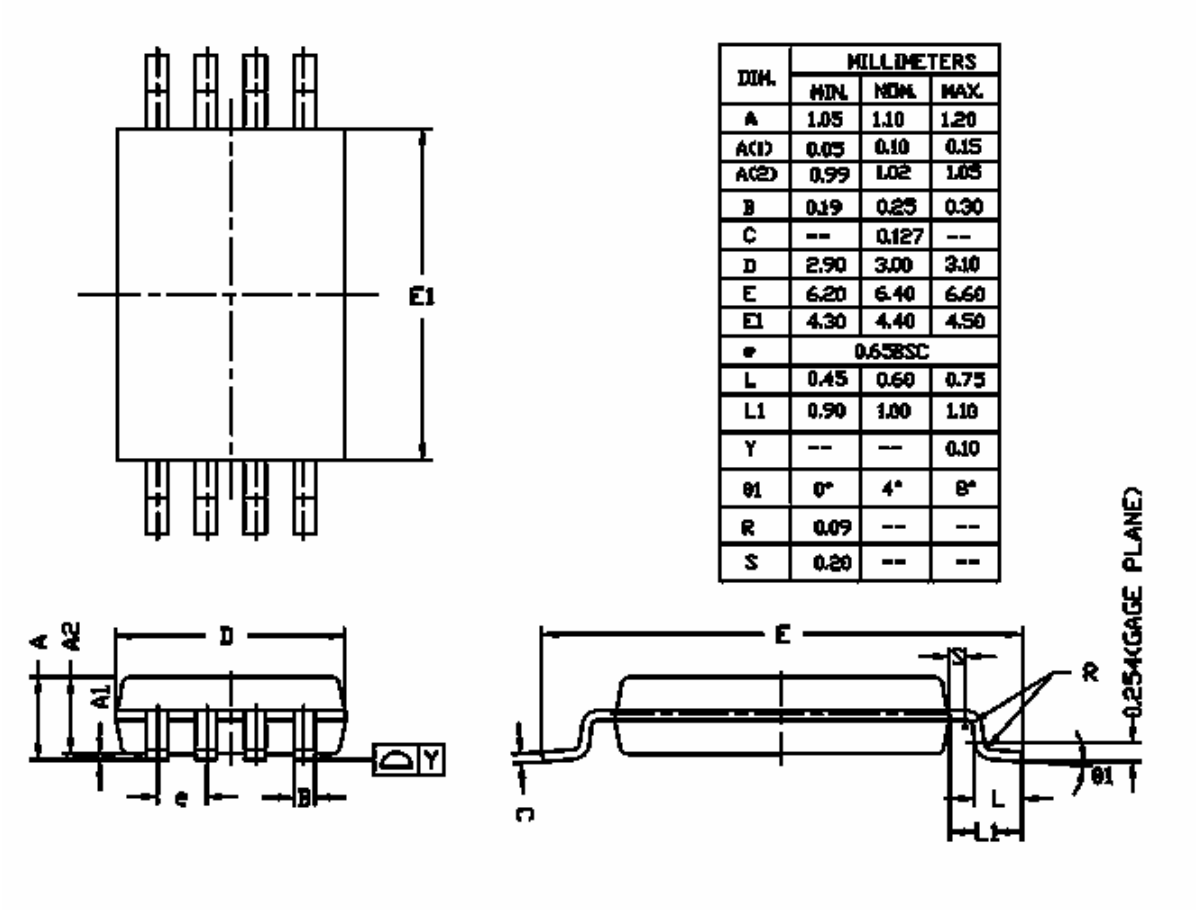


Fig14. Single Pulse Maximum Peak Current

Physical Dimension

TSSOP, 8 Leads

Dimensions are in millimeters, unless otherwise specified



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.05	1.10	1.20
A(1)	0.05	0.10	0.15
A(2)	0.99	1.02	1.05
B	0.19	0.25	0.30
C	--	0.127	--
D	2.90	3.00	3.10
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
L1	0.90	1.00	1.10
Y	--	--	0.10
θ1	0°	4°	8°
R	0.09	--	--
S	0.20	--	--

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
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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
Email : koreasales@magnachip.com