

General Description

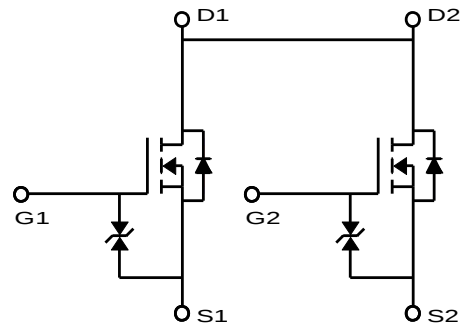
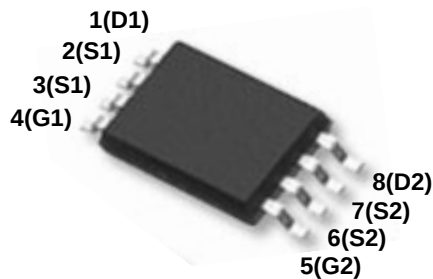
The MDC0531E uses advanced MagnaChip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent reliability. Low $R_{DS(ON)}$ and low gate charge operation with gate voltage as low as 2.5V

Features

- $V_{DS} = 30V$
- $I_D = 8.0A$ @ $V_{GS} = 10V$
- $R_{DS(ON)} < 20m\Omega$ @ $V_{GS} = 10V$
 $< 23m\Omega$ @ $V_{GS} = 4.5V$

Applications

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



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

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

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	75	$^\circ C/W$
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}	$I_D = 250\mu A, V_{GS} = 0V$	30	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	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}	$V_{GS} = \pm 10V, V_{DS} = 0V$	-	-	10	μA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 5.0A$		17	20	m Ω
		$V_{GS} = 4.5V, I_D = 5.0A$	-	19	23	
		$V_{GS} = 2.5V, I_D = 3.0A$	-	24	-	
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	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 15V, R_L = 1.25\Omega, R_G = 3\Omega$	-	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}	$I_F = 11.6A, di/dt = 100A/\mu s$	-	24		ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	13		nC

Note :

1. Surface mounted FR-4 board with 2oz. Copper.

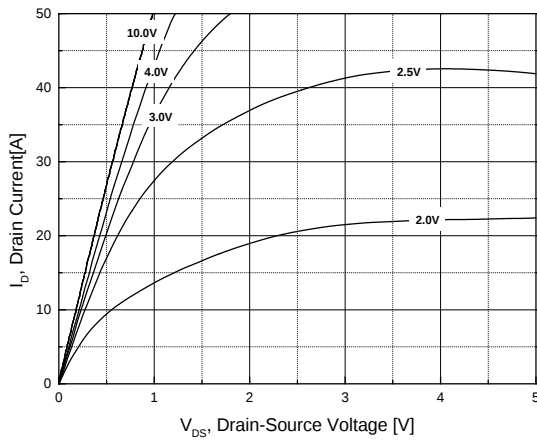


Fig.1 On-Region Characteristics

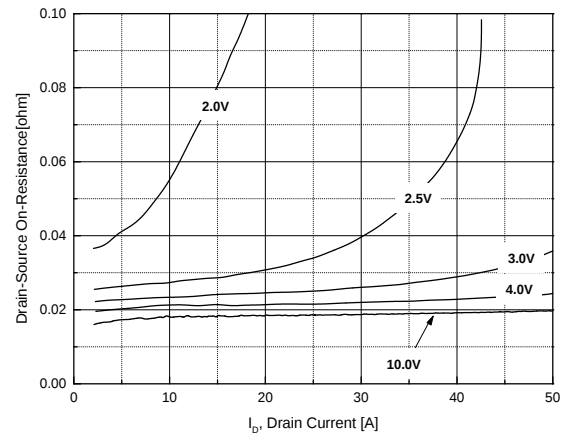


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

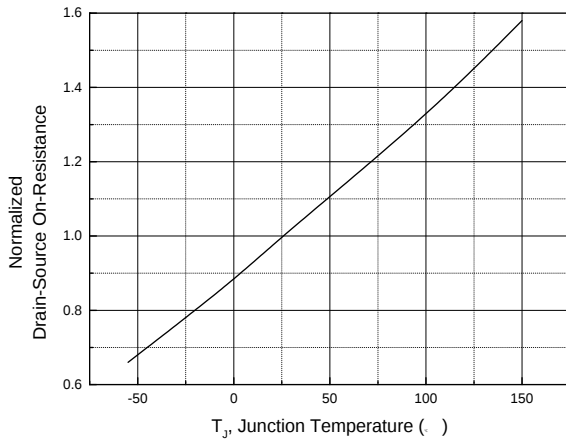


Fig.3 On-Resistance Variation with Temperature

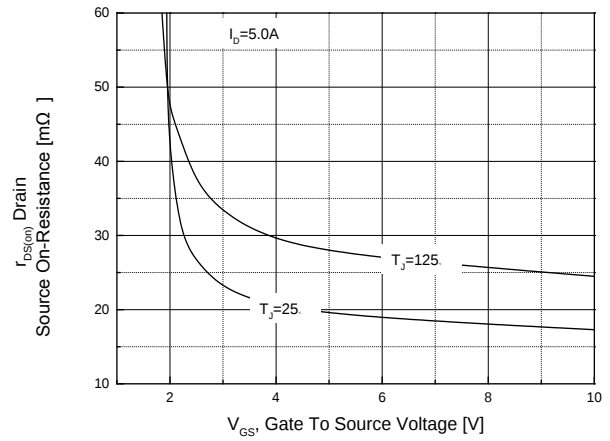


Fig.4 On-Resistance Variation with Gate to Source Voltage

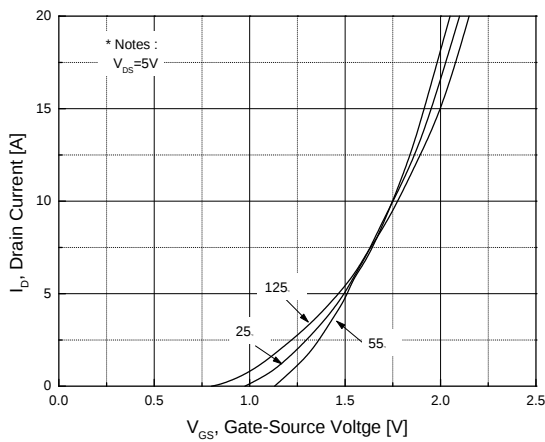


Fig.5 Transfer Characteristics

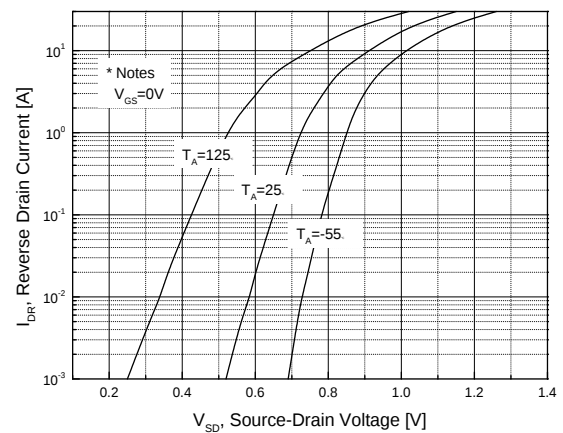


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

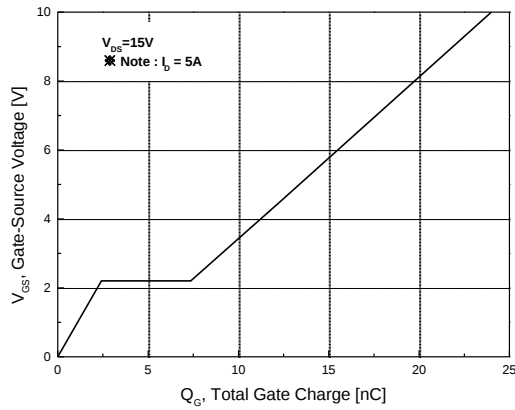


Fig.7 Gate Charge Characteristics

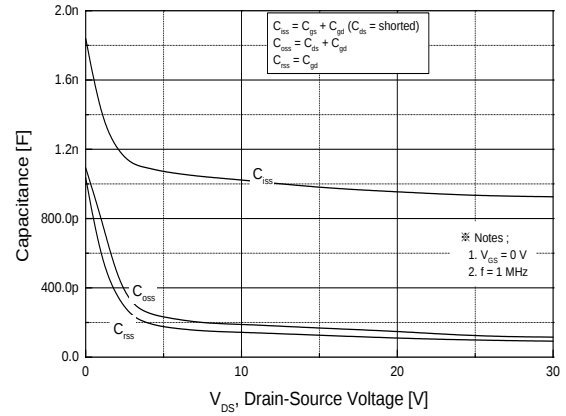


Fig.8 Capacitance Characteristics

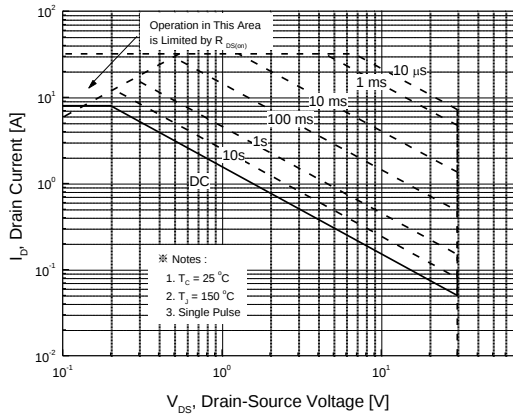


Fig.9 Maximum Safe Operating Area

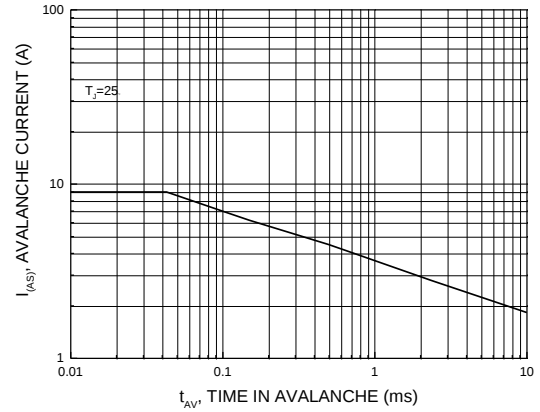


Fig.10 Unclamped Inductive Switching Capability

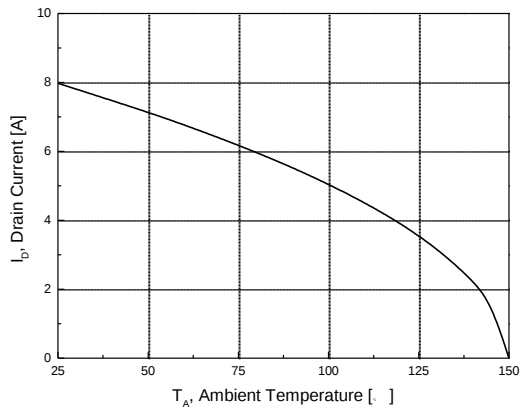


Fig.11 Maximum Drain Current vs. Case Temperature

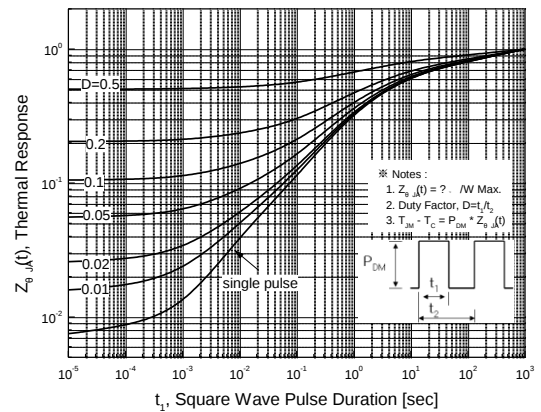


Fig.12 Transient Thermal Response Curve

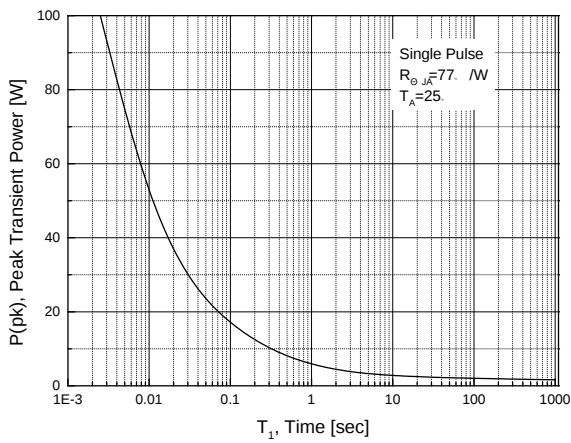


Fig13. Single Pulse Maximum Power Dissipation

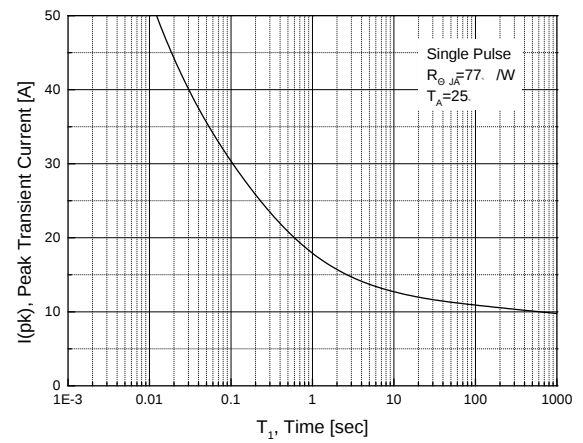
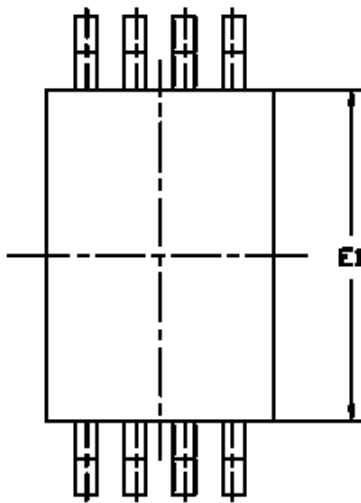


Fig14. Single Pulse Maximum Peak Current

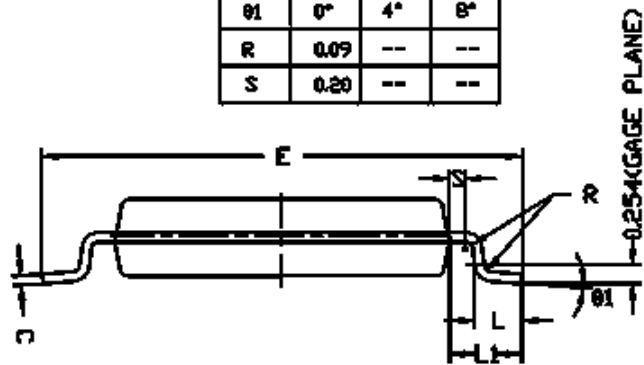
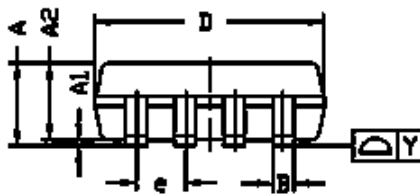
Physical Dimension

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
φ	0.658SC		
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	--	--



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