MJ N-Channel Enhancement Mode Power MOSFET

Description

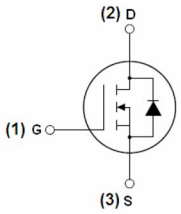
The MJ85H21T uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in automotive applications and a wide variety of other applications.

General Features

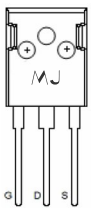
- V_{DS}=85V,I_D=210A
  $R_{DS(ON)}$<3.5mΩ @ V_{GS}=10V
- Good stability and uniformity with high E_{AS}
- Special process technology for high ESD capability
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

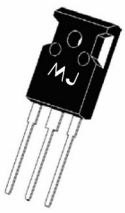
- Automotive applications
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic diagram



Marking and pin assignment



TO-247 top view

100% UIS TESTED! 100% ΔVds TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJ85H21T	MJ85H21T	TO-247	-	-	-

Absolute Maximum Ratings (T_C =25 ℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	85	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	210	A
Drain Current-Continuous(T_C =100℃)	$I_{D(100℃)}$	150	A
Pulsed Drain Current	I_{DM}	850	A
Maximum Power Dissipation	P_D	330	W
Single pulse avalanche energy (Note 3)	E_{AS}	220	mJ
Derating factor		2.2	W/℃
Peak Diode Recovery dv/dt (Note 4)	dv/dt	5	V/ns
Operating Junction and Storage Temperature Range	T_J ,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 1)	$R_{\theta JA}$	0.45	℃/W

Electrical Characteristics (T_A =25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	85	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=85V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS}=±20V,V_{DS}=0V	-	-	±200	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} ,I_D=250μA	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A	-	2.9	3.5	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=20A	35	-	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz	-	11000	-	PF
Output Capacitance	C_{oss}		-	914	-	PF
Reverse Transfer Capacitance	C_{rss}		-	695	-	PF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,I_D=2A,R_L=15Ω V_{GS}=10V,R_{GEN}=2.5Ω	-	23	-	nS
Turn-on Rise Time	t_r		-	190	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	130	-	nS
Turn-Off Fall Time	t_f		-	120	-	nS
Total Gate Charge	Q_g	V_{DD}=30V,I_D=30A, V_{GS}=10V	-	250	-	nC
Gate-Source Charge	Q_{gs}		-	48	-	nC
Gate-Drain Charge	Q_{gd}		-	98	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=40A	-	-	1.2	V
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=40A di/dt=100A/μs (Note 2)	-	63	-	nS
Reverse Recovery Charge	Q_{rr}		-	98	-	nC
Forward Turn-On Time	ton	Intrinsic turn-on time is negligible(turn-on is dominated by LS+LD)				

Notes:

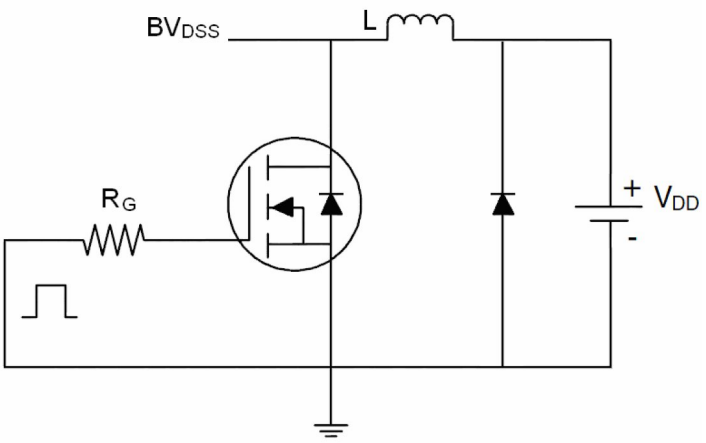
① Surface Mounted on FR4 Board, t≤10sec.

② Pulse Test: Pulse Width≤400μs, Duty Cycle≤2%.

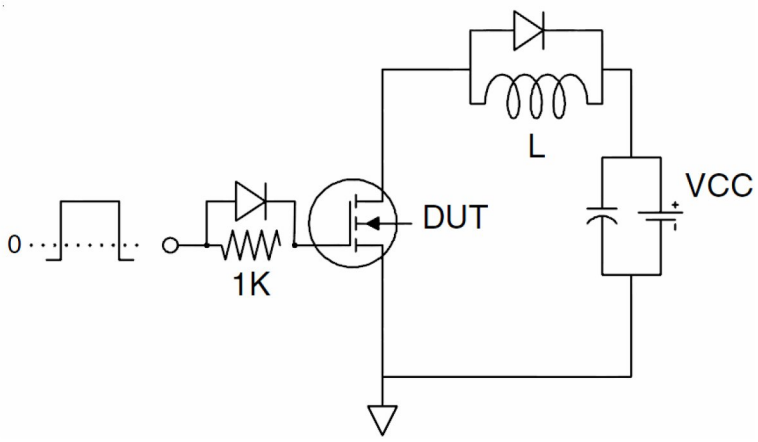
③ EAS condition：T_j=25℃,V_{DD}=42.5V,V_G=10V,L=2mH,Rg=25Ω,I_{AS}=37A

④ I_{SD}≤125A, di/dt≤260A/μs, V_{DD}≤$V_{(BR)DSS}$, T_J≤175°C

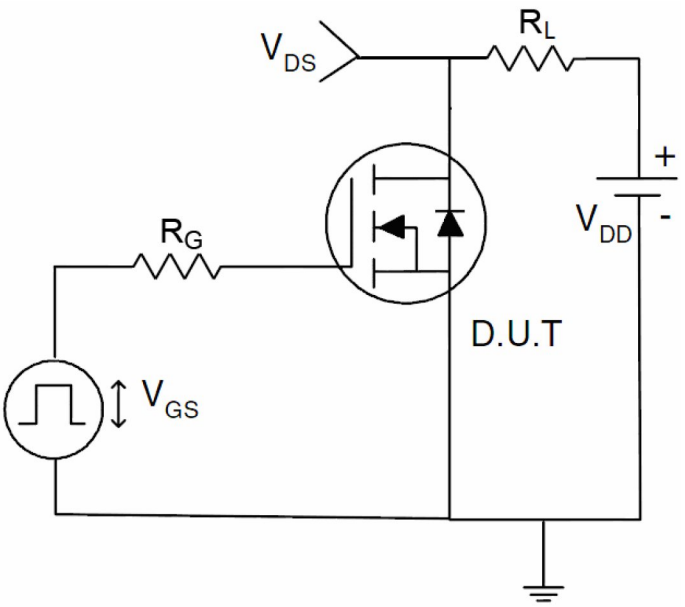
Test circuit



EAS test Circuit



Gate charge test Circuit



Switch Time Test Circuit

Typical Electrical and Thermal Characteristics (Curves)

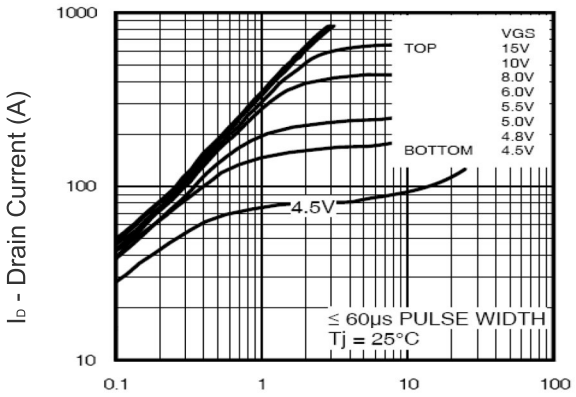


Figure 1 Output Characteristics

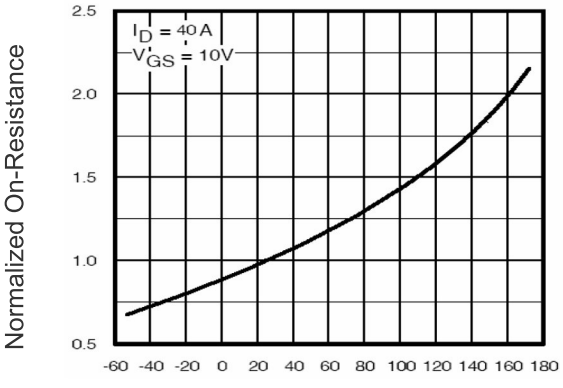


Figure 4 Rdson-Junction Temperature

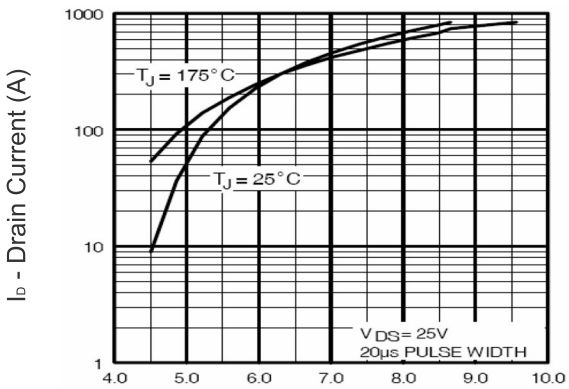


Figure 2 Transfer Characteristics

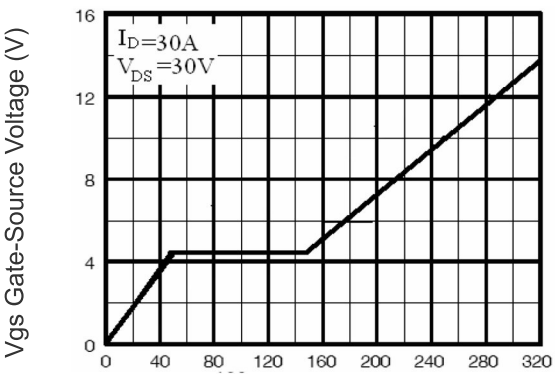


Figure 5 Gate Charge

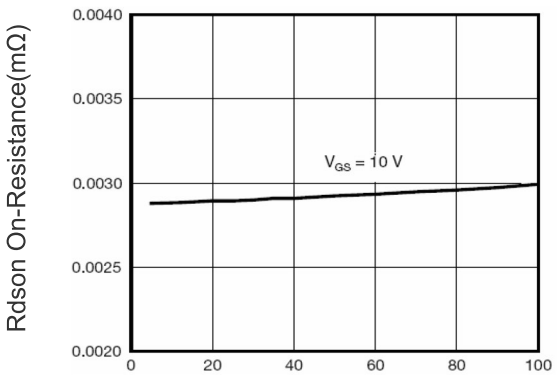


Figure 3 Rdson- Drain Current

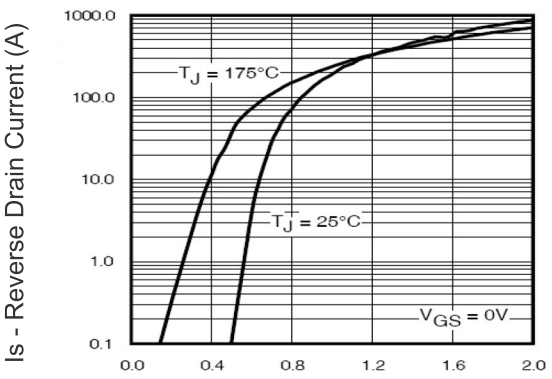


Figure 6 Source- Drain Diode Forward

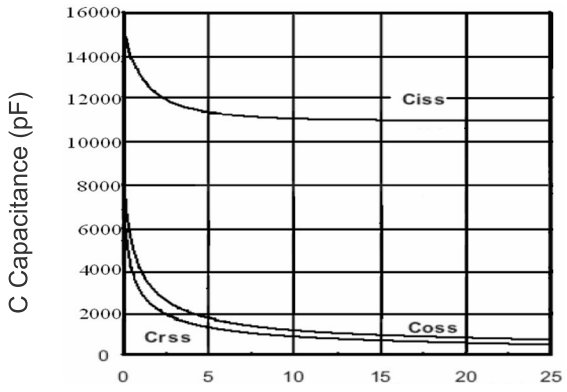


Figure 7 Capacitance vs Vds

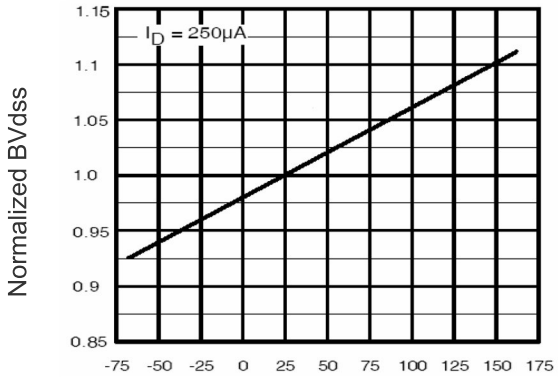


Figure 9 BV_{DSS} vs Junction Temperature

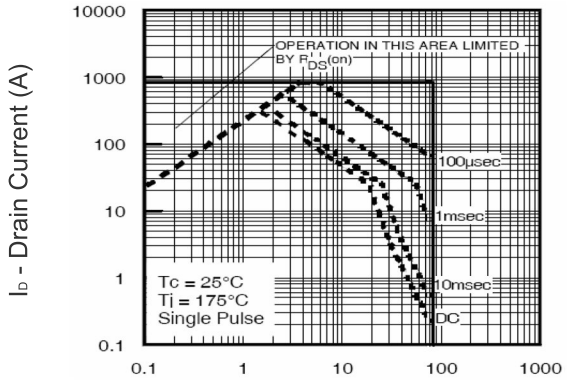


Figure 8 Safe Operation Area

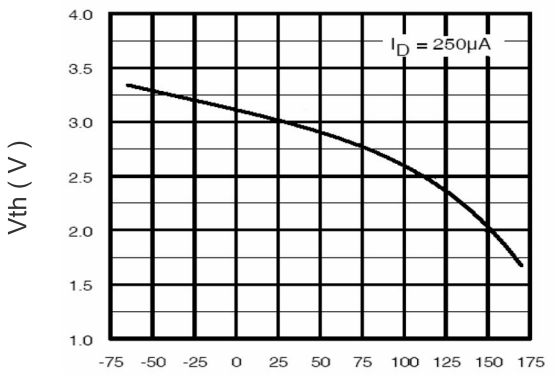


Figure 10 $V_{GS(th)}$ vs Junction Temperature

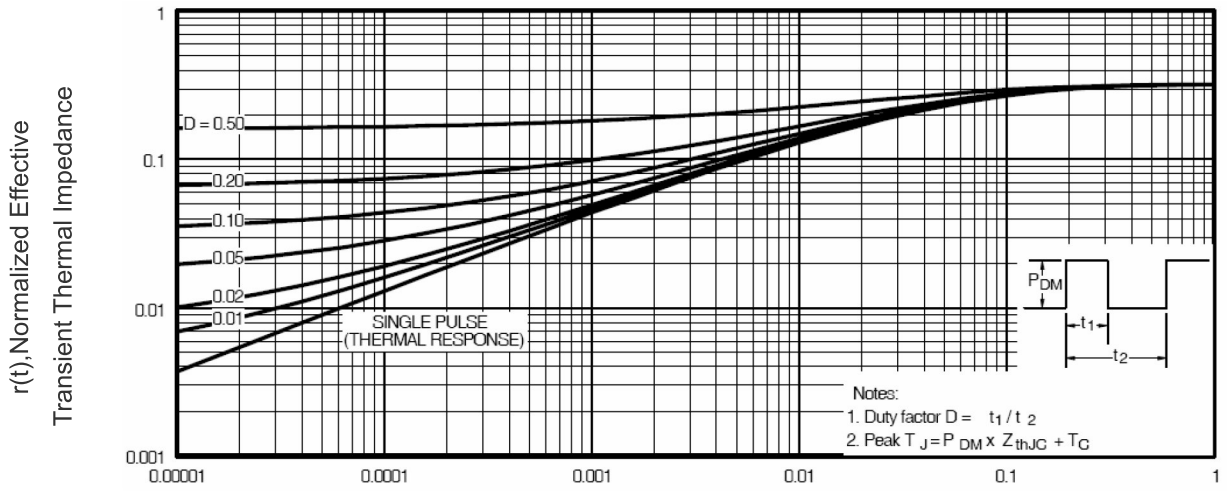
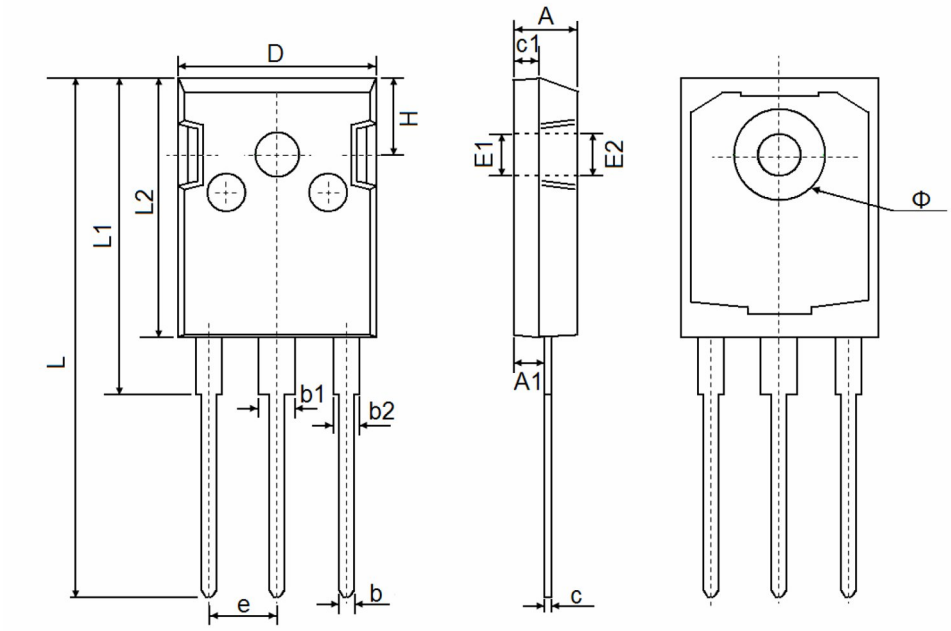


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-247 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	

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