

# MJ N-Channel Enhancement Mode Power MOSFET

## Description

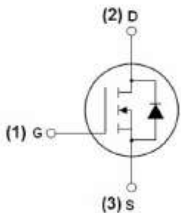
The MJ75H35TC uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in automotive applications and a wide variety of other applications.

## General Features

- ◆  $V_{DS} = 75V, I_D = 350A$   
 $R_{DS(ON)} < 2.2m\Omega @ V_{GS} = 10V$  (Typ: 1.7 m $\Omega$ )
- ◆ Good stability and uniformity with high  $E_{AS}$
- ◆ Special process technology for high ESD capability
- ◆ High density cell design for ultra low  $R_{dson}$
- ◆ 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



TO-247 top view

100% UIS TESTED! 100%  $\Delta V_{ds}$  TESTED!

## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MJ75H35TC	MJ75H35TC	TO-247	-	-	-

## Absolute Maximum Ratings (T<sub>c</sub>=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	75	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current-Continuous	$I_D$	350	A
Drain Current-Continuous(T <sub>c</sub> =100°C)	$I_{D(100^{\circ}C)}$	270	A
Pulsed Drain Current	$I_{DM}$	1280	A
Maximum Power Dissipation	$P_D$	460	W
Derating factor		3.07	W/°C
Single pulse avalanche energy <sup>(Note 3)</sup>	$E_{AS}$	3500	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	°C

## Thermal Characteristic

Thermal Resistance,Junction-to-Case <sup>(Note 1)</sup>	$R_{\theta JC}$	0.33	°C/W
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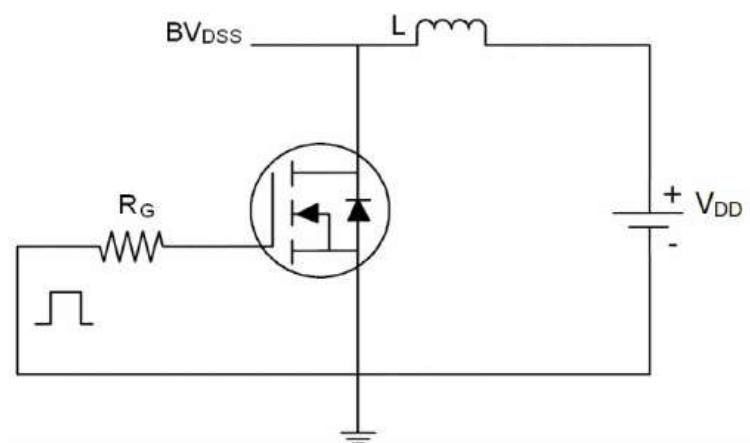
Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	75	86	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =75V,V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =±20V,V <sub>GS</sub> =0V	-	-	±200	nA
On Characteristics						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA	2	3	4	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =40A	-	1.7	2.2	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =25V,I <sub>D</sub> =40A	100	-	-	S
Dynamic Characteristics						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V,V <sub>GS</sub> =0V F=1.0MHz	-	25500	-	PF
Output Capacitance	C <sub>oss</sub>		-	1652	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	1261	-	PF
Switching Characteristics						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =40V,I <sub>D</sub> =40A V <sub>GS</sub> =10V,R <sub>GEN</sub> =1.2Ω (Note 2)	-	50	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	235	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	180	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	280	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =40V,I <sub>D</sub> =40A V <sub>GS</sub> =10V (Note 2)	-	586	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	120	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	200	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V,I <sub>S</sub> =40A	-	-	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>F</sub> =40A di/dt=100A/μs (Note 2)	-	170	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	500	-	nC

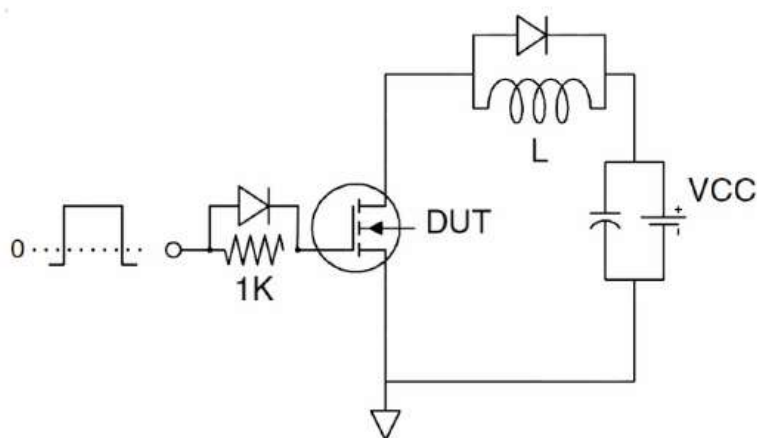
## Notes:

- ① Surface Mounted on FR4 Board, t ≤ 10 sec.  
② Pulse Test: Pulse Width ≤ 400μs, Duty Cycle ≤ 2%.  
③ EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=37.5V, V<sub>G</sub>=10V, L=1mH, R<sub>g</sub>=25Ω.  
④ I<sub>SD</sub>≤125A, di/dt≤260A/μs, V<sub>DD</sub>≤V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤175°C

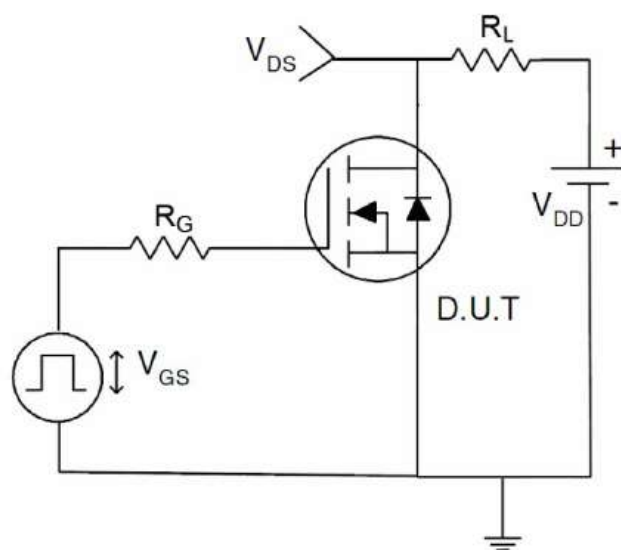
## Test circuit



EAS test Circuit

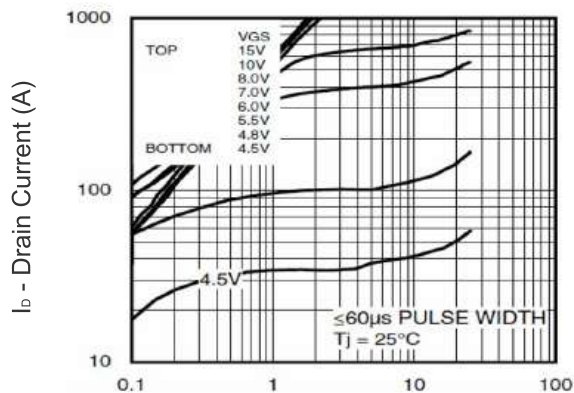


Gate charge test Circuit

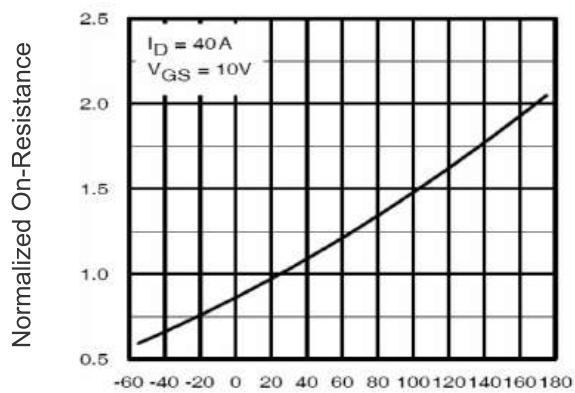


Switch Time Test Circuit

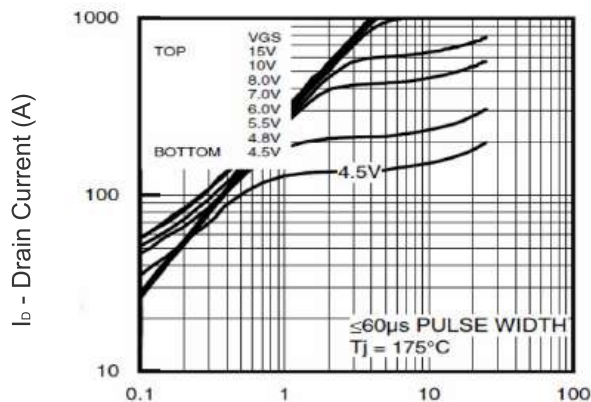
## Typical Electrical and Thermal Characteristics (Curves)



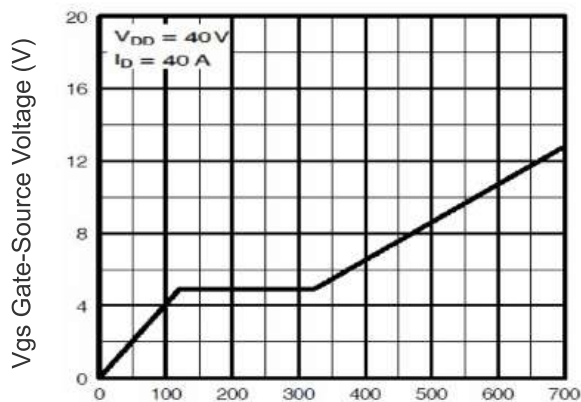
V<sub>DS</sub> Drain-Source Voltage (V)  
Figure 1 Output Characteristics



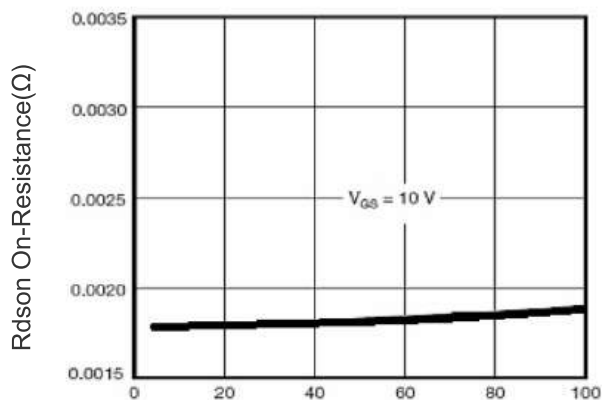
T<sub>J</sub> -Junction Temperature(°C)  
Figure 4 Rdson-Junction Temperature



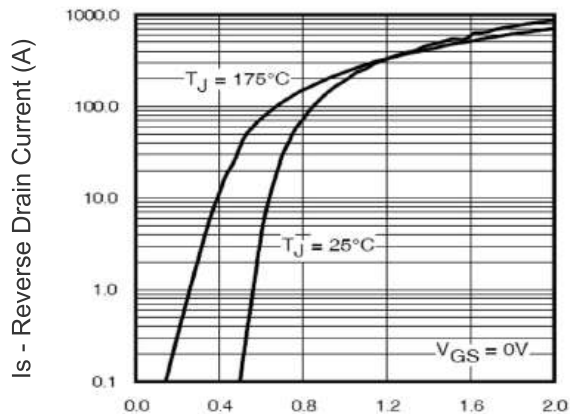
V<sub>GS</sub> Gate-Source Voltage (V)  
Figure 2 Transfer Characteristics



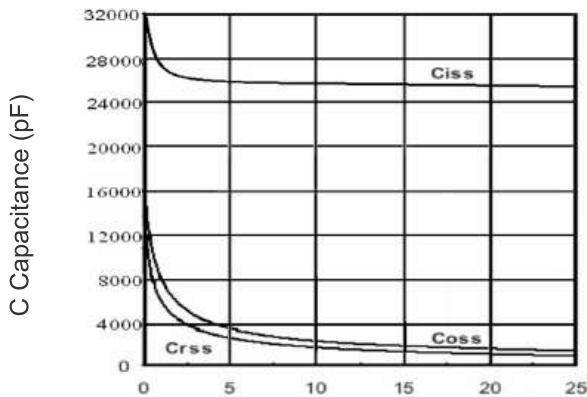
Q<sub>g</sub> Gate Charge (nC)  
Figure 5 Gate Charge



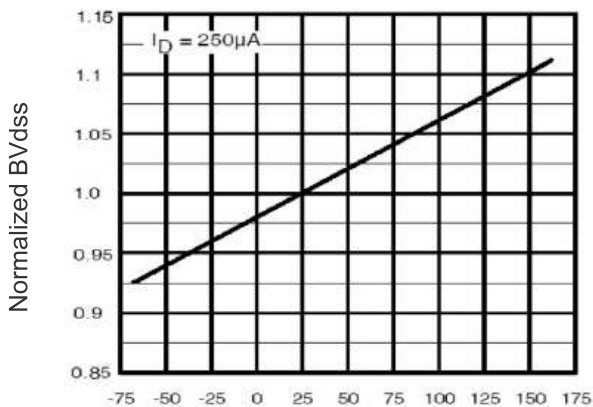
I<sub>D</sub> - Drain Current (A)  
Figure 3 Rdson- Drain Current



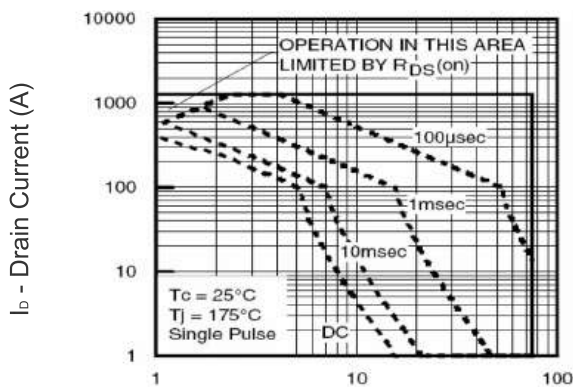
V<sub>SD</sub> Source-Drain Voltage (V)  
Figure 6 Source- Drain Diode Forward



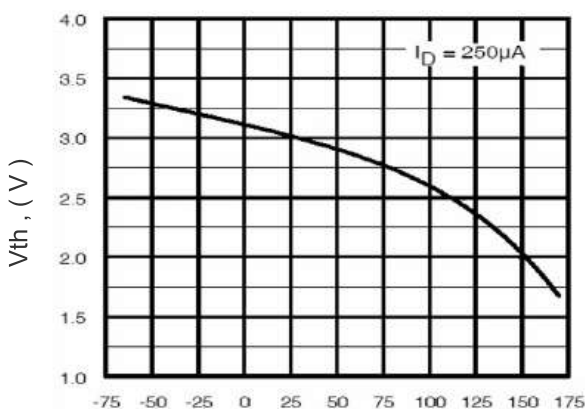
Vds Drain-Source Voltage (V)  
Figure 7 Capacitance vs Vds



Tj -Junction Temperature(°C)  
Figure 9 BVdss vs Junction Temperature



Vds Drain-Source Voltage (V)  
Figure 8 Safe Operation Area



Tj -Junction Temperature(°C)  
Figure 10 VGS(th) vs Junction Temperature

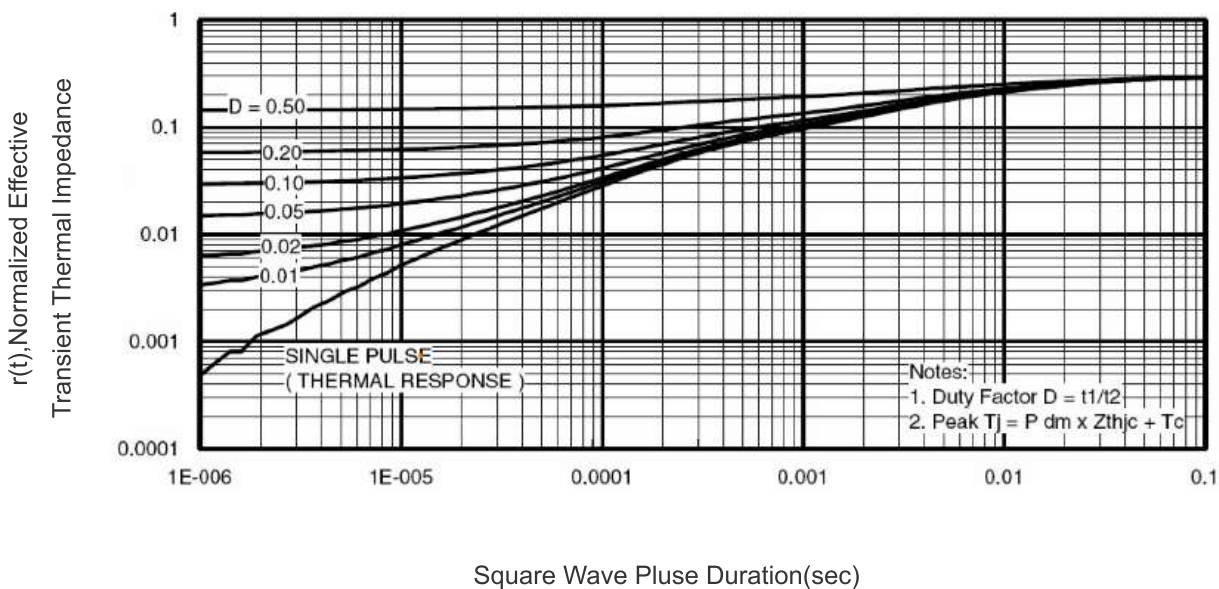
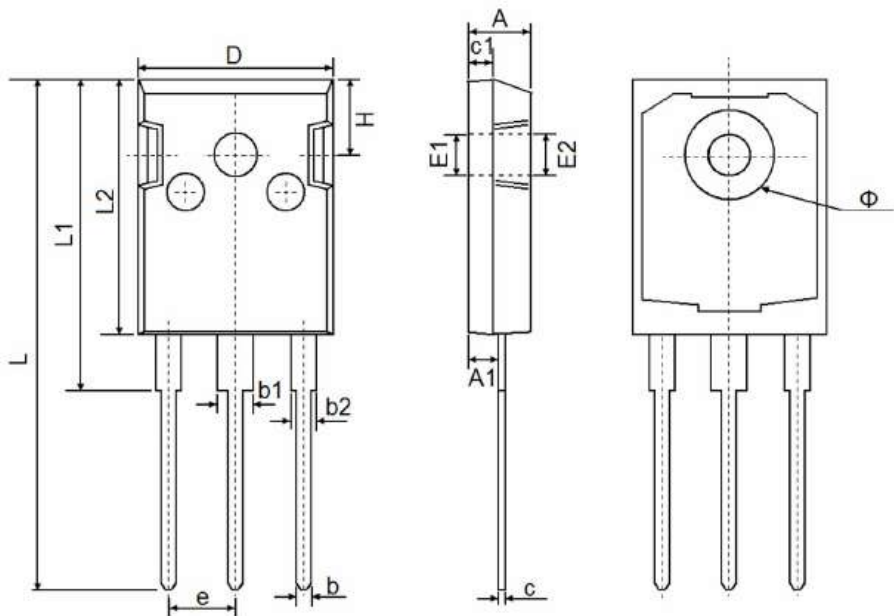


Figure 11 Normalized Maximum Transient Thermal Impedance

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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