

TO-252-2L Plastic-Encapsulate MOSFET

60V N-Channel MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
60V	12m Ω @10V	55A
	14m Ω @4.5V	

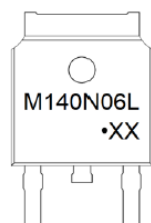
Feature

- Trench Technology Power MOSFET
- Low $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

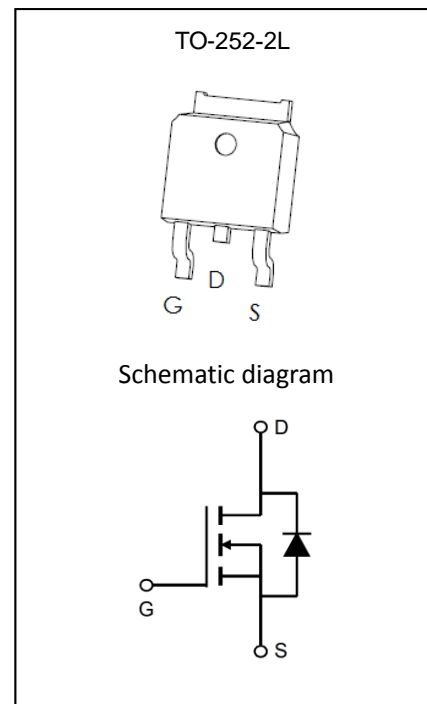
Application

- Power Switching Application

MARKING:



M140N06L = Device Code
 XX = Date Code
 Solid Dot = Green Indicator



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ¹	$T_C = 25^\circ\text{C}$	I_D	55 A
	$T_C = 100^\circ\text{C}$	I_D	34 A
Pulsed Drain Current ²	I_{DM}	220	A
Single Pulsed Avalanche Current ³	I_{AS}	16	A
Single Pulsed Avalanche Energy ³	E_{AS}	64	mJ
Power Dissipation ⁵	$T_C = 25^\circ\text{C}$	P_D	60 W
Thermal Resistance from Junction to Ambient ⁶	$R_{\theta JA}$	40	$^\circ\text{C}/\text{W}$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.1	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

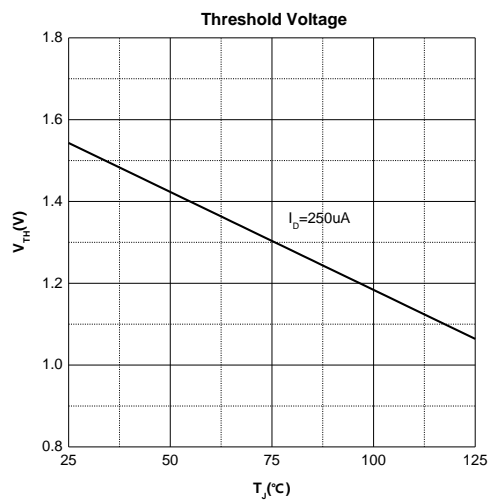
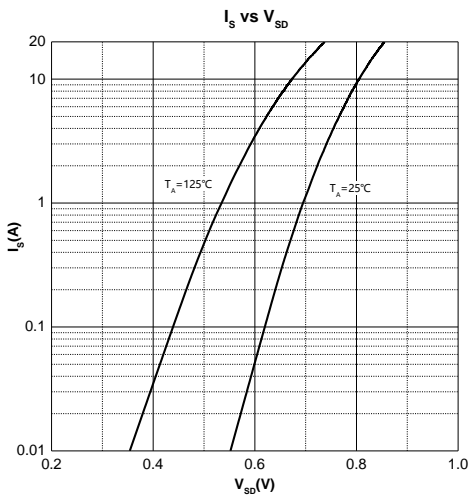
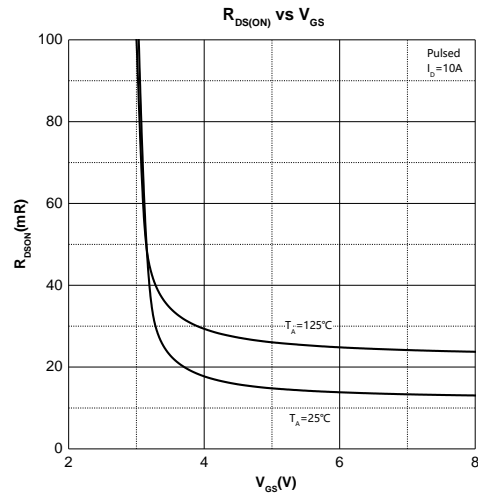
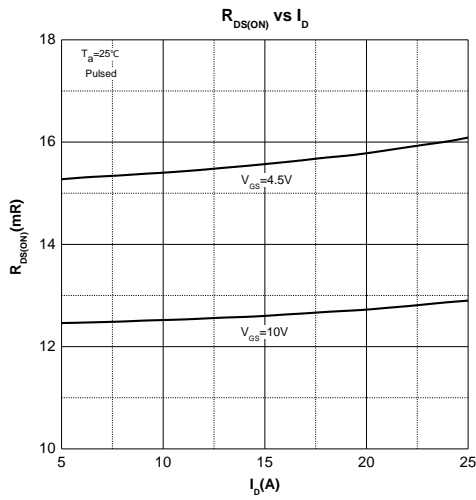
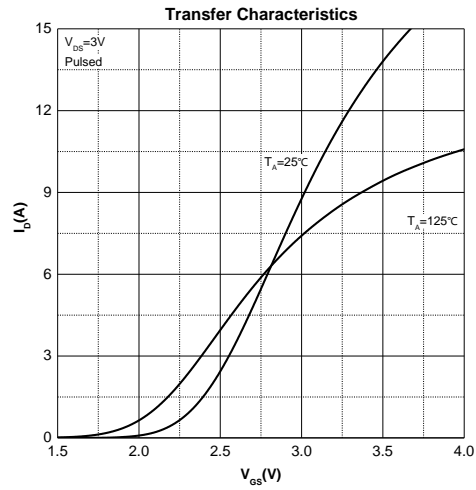
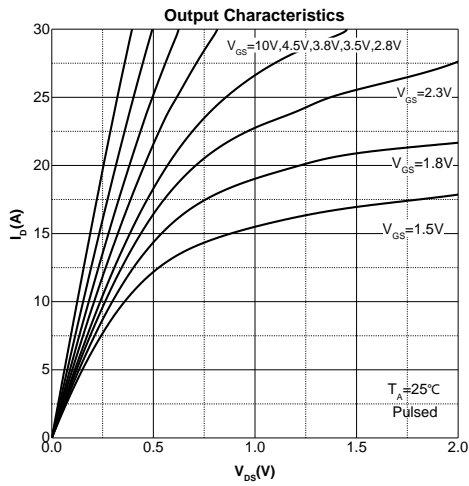
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$			1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
On Characteristics⁴						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.5	3.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$		12	16	m Ω
		$V_{GS} = 4.5V, I_D = 10A$		14	21	
Forward Transconductance	g_{FS}	$V_{DS} = 5V, I_D = 20A$	10	26		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$		1764		pF
Output Capacitance	C_{oss}			118		
Reverse Transfer Capacitance	C_{rss}			107		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		0.9		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 30V, V_{GS} = 10V, I_D = 20A$		38		nC
Gate-Source Charge	Q_{gs}			4.2		
Gate-Drain Charge	Q_{gd}			9.5		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30V, V_{GS} = 10V, R_L = 1.5\Omega$ $R_G = 3\Omega$		9		ns
Turn-On Rise Time	t_r			5		
Turn-Off Delay Time	$t_{d(off)}$			28		
Turn-Off Fall Time	t_f			6		
Source-Drain Diode Characteristics						
Diode Forward Voltage ⁴	V_{SD}	$V_{GS} = 0V, I_S = 20A$			1.2	V
Diode Reverse Recovery Time	t_{rr}	$I_F = 20A, di/dt = 500A/ms$		29		ns
Diode Reverse Recovery Charge	Q_{rr}	$I_F = 20A, di/dt = 500A/ms$		104		nC

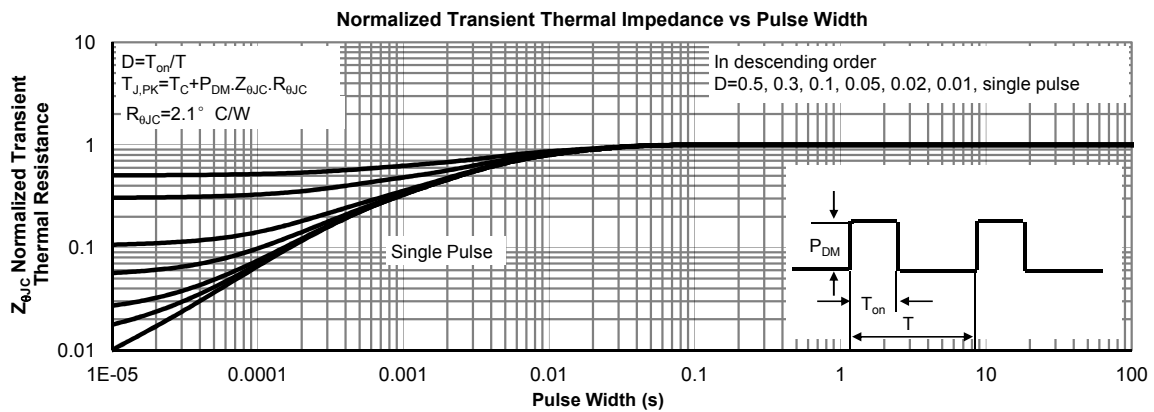
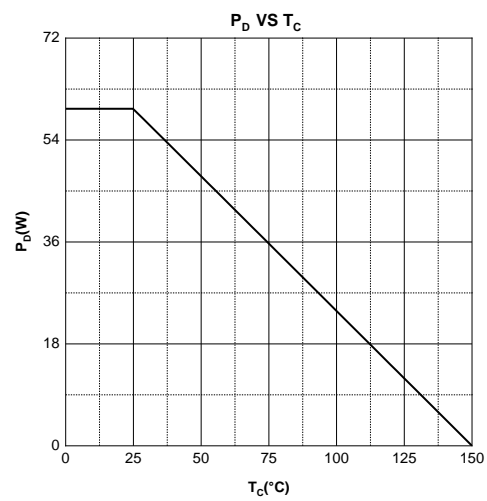
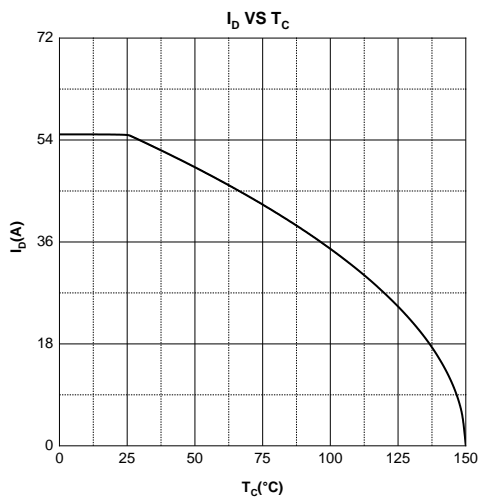
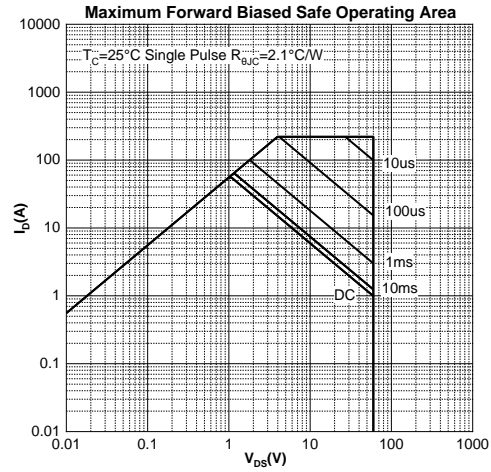
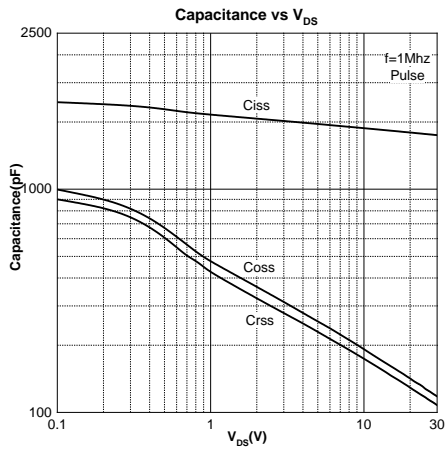
Notes :

- 1.The maximum current rating is limited by package.And device mounted on a large heatsink
- 2.Pulse Test : Pulse Width $\leq 10\mu s$, duty cycle $\leq 1\%$.
- 3.EAS condition: $V_{DD} = 30V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$ Starting $T_J = 25^\circ\text{C}$.
- 4.Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 5.The power dissipation P_D is limited by $T_{J(MAX)} = 150^\circ\text{C}$.And device mounted on a large heatsink
- 6.Device mounted on $1in^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$.

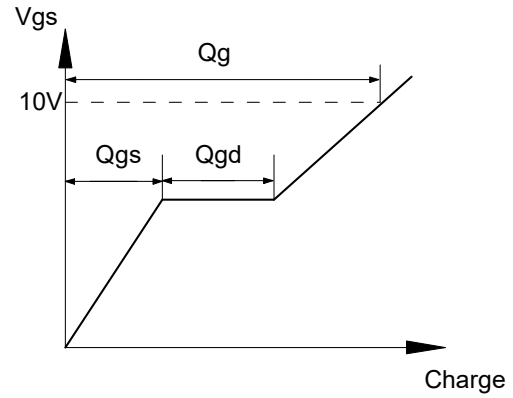
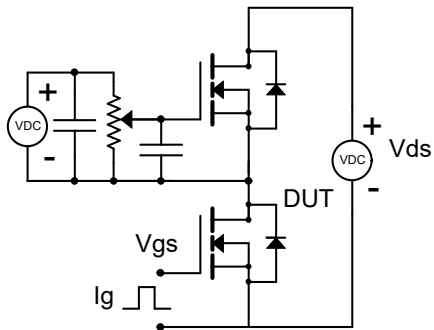
Typical Characteristics



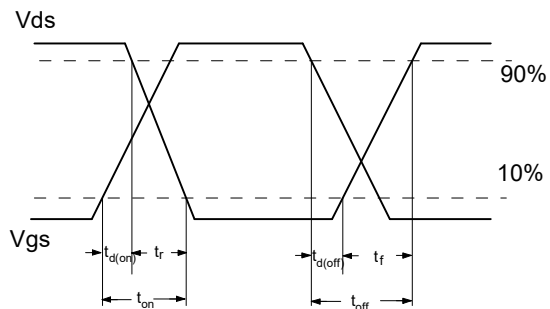
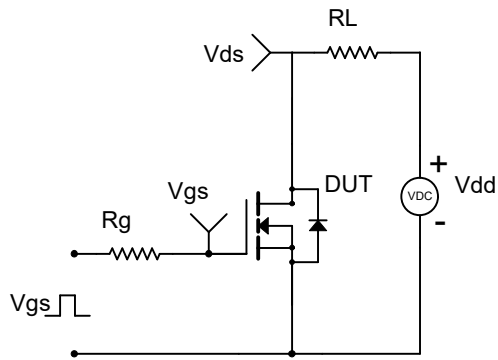
Typical Characteristics



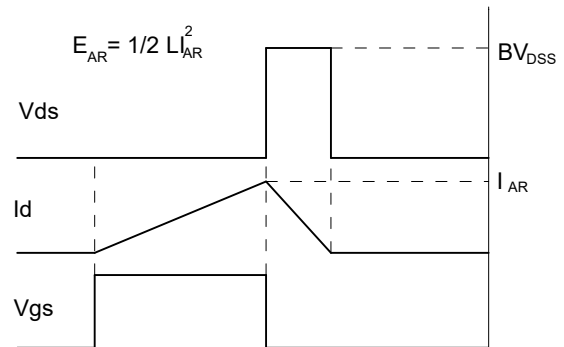
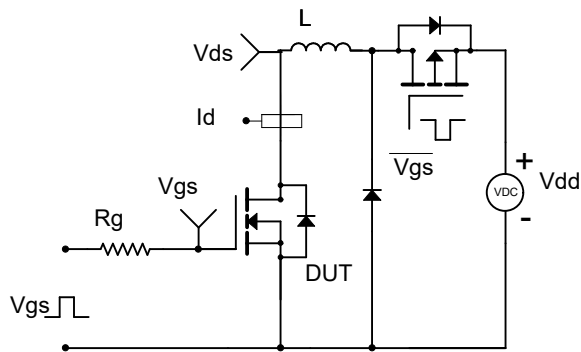
Gate Charge Test Circuit & Waveform



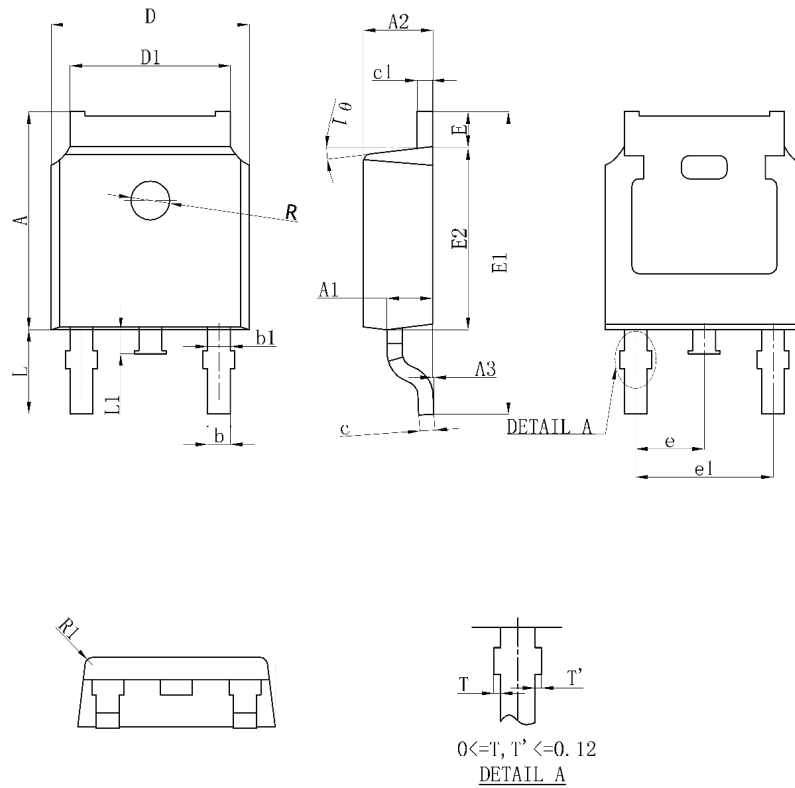
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



TO-252-2L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	6.850	7.250	0.269	0.285
A1	0.960	1.060	0.038	0.042
A2	2.200	2.400	0.087	0.094
A3	0.000	0.127	0.000	0.005
b	0.760REF		0.030REF	
b1	1.000REF		0.039REF	
c	0.508REF		0.020REF	
c1	0.508REF		0.020REF	
D	6.250	6.850	0.246	0.270
D1	5.050	5.650	0.199	0.222
E	0.850	1.050	0.033	0.041
E1	9.700	10.400	0.382	0.409
E2	5.800	6.400	0.228	0.252
e	2.286BSC		0.090BSC	
e1	4.572REF		0.180REF	
L	2.650	2.950	0.104	0.116
L1	0.600	0.900	0.024	0.035
θ	7°REF		7°REF	
R	1.300REF		0.051REF	
R1	0.250REF		0.010REF	

NOTICE

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