

Product Summary

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

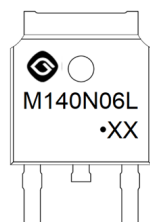
Feature

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

Application

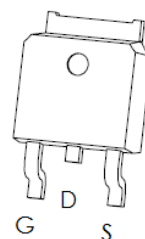
- Power Switching Application

MARKING:

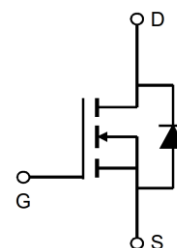


M140N06L = Device Code
XX = Date Code
Solid Dot = Green Indicator

TO-252-2L



Schematic diagram



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		P_D	60	W
$T_C = 25^\circ\text{C}$				
Thermal Resistance from Junction to Ambient ⁶		$R_{\theta JA}$	40	$^\circ\text{C/W}$
Thermal Resistance from Junction to Case		$R_{\theta JC}$	2.1	$^\circ\text{C/W}$
Junction Temperature		T_J	150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55~ +150	$^\circ\text{C}$

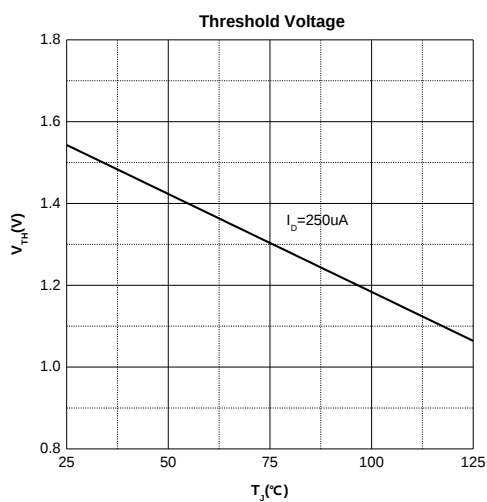
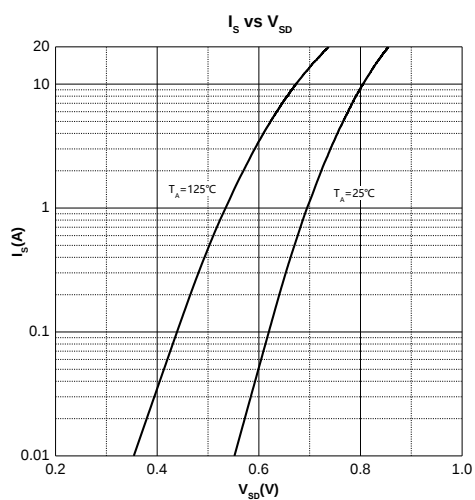
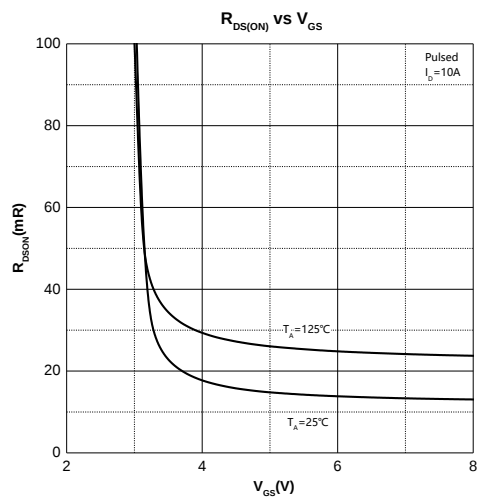
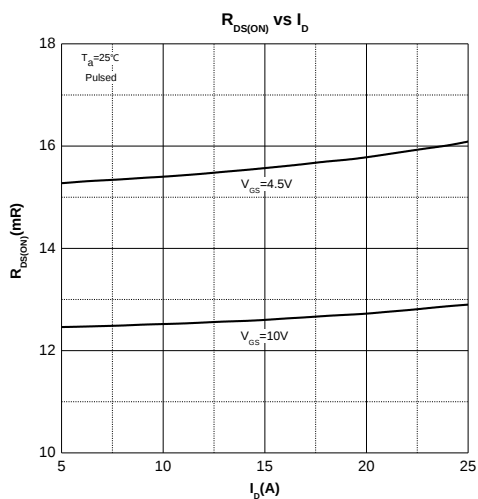
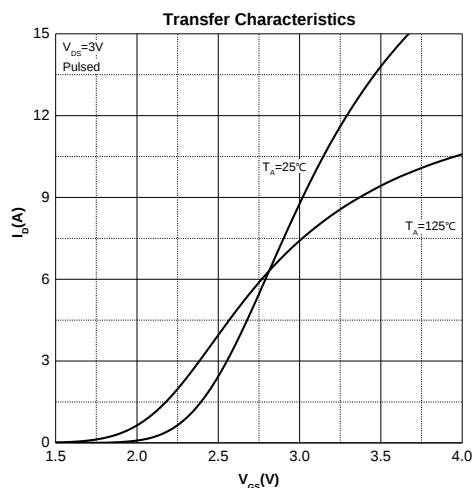
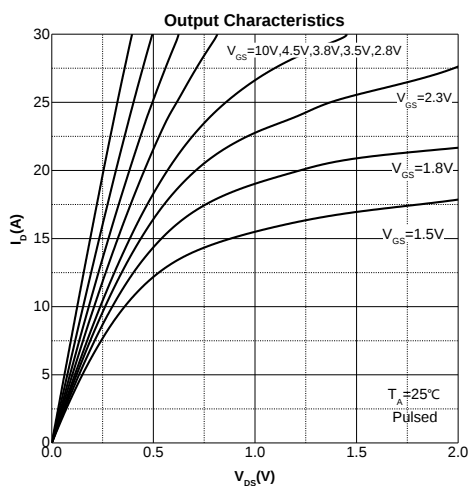
MOSFET ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

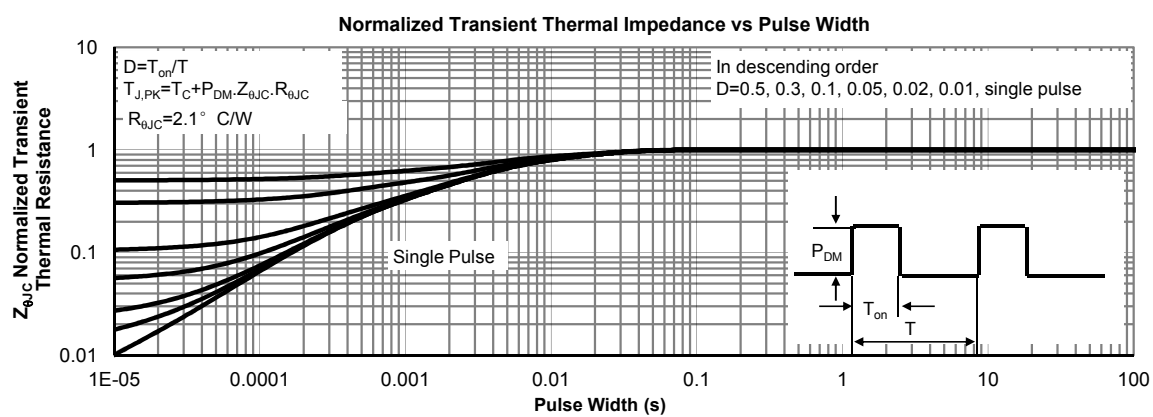
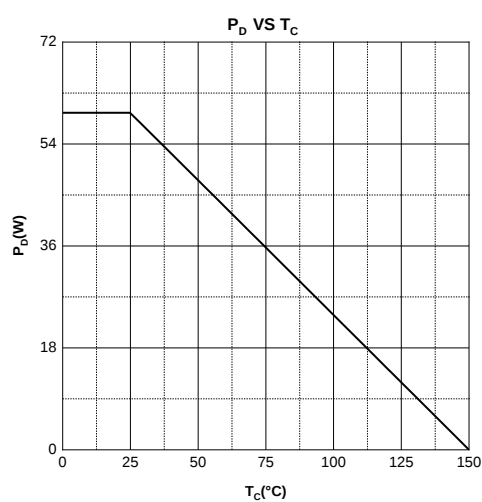
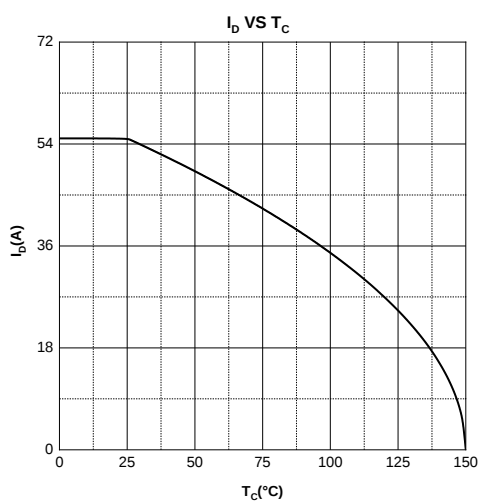
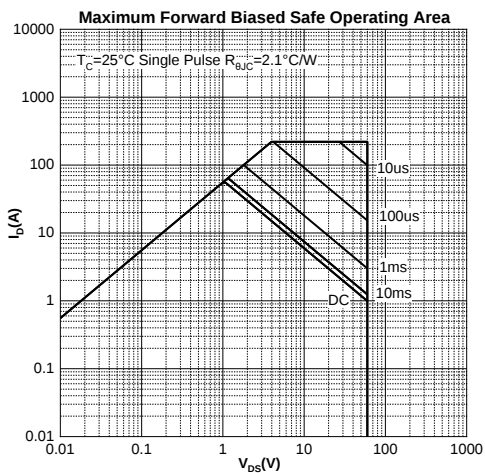
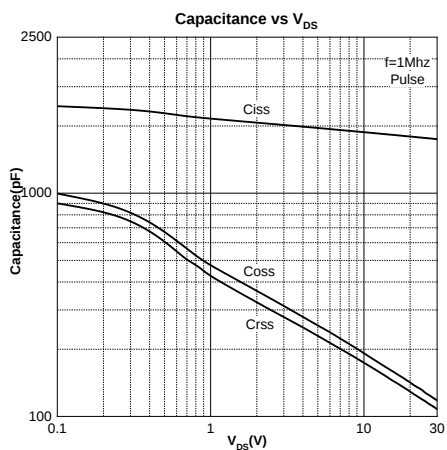
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60V, V _{GS} = 0V			1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
On Characteristics ⁴						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.0	1.5	3.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 20A		12	16	mΩ
		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 = 1.5Ω R _G = 3Ω		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

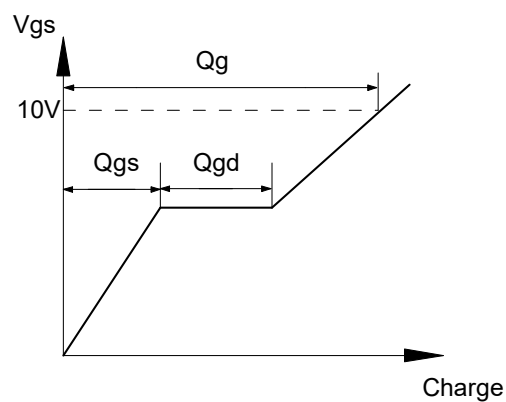
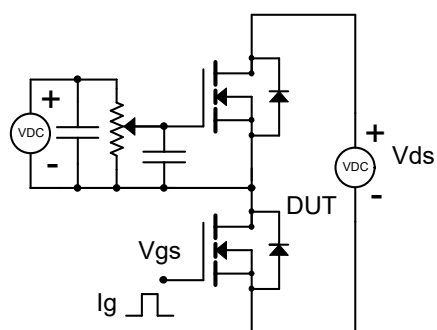
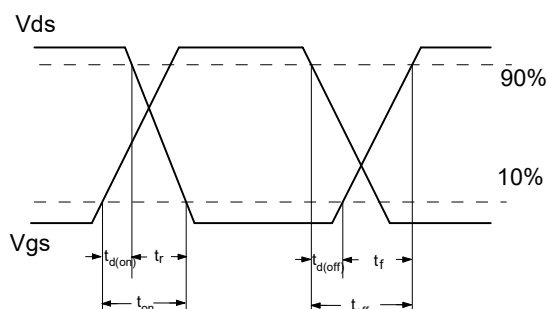
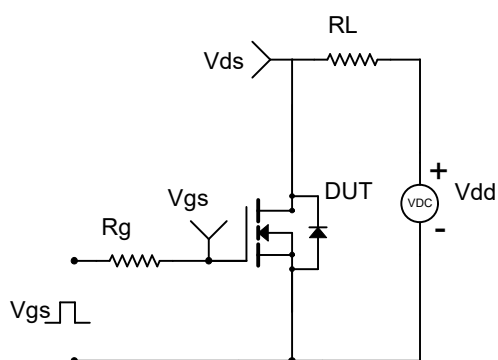
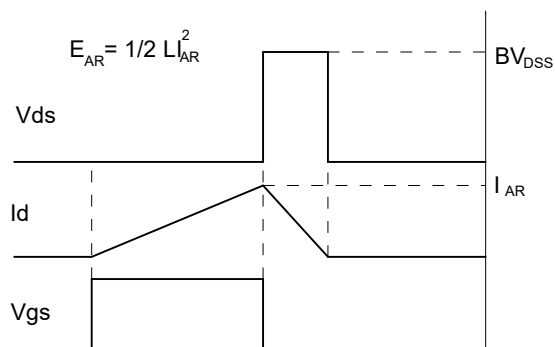
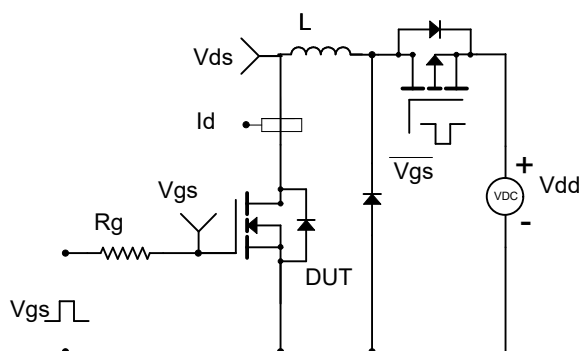
Notes :

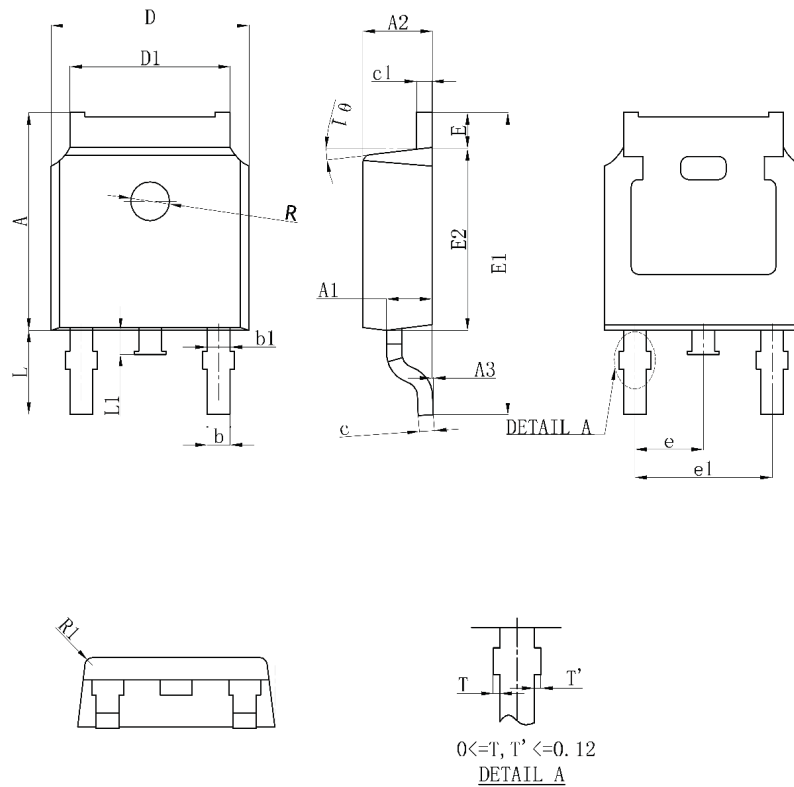
- 1.The maximum current rating is limited by package.And device mounted on a large heatsink
- 2.Pulse Test : Pulse Width ≤ 10μs, duty cycle ≤ 1%.
- 3.EAS condition: V_{DD} = 30V, V_{GS} = 10V, L = 0.5mH, R_G = 25Ω Starting T_J = 25°C.
- 4.Pulse Test : Pulse Width ≤ 300μs, duty cycle ≤ 2%.
- 5.The power dissipation P_D is limited by T_{J(MAX)} = 150°C.And device mounted on a large heatsink
- 6.Device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C.

Typical Characteristics





Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveform

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms


TO-252-2L Package Information


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	

Attention:

- GreenPower Electronics reserves the right to improve product design function and reliability without notice.
- Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.
- GreenPower Electronics products belong to consumer electronics or other civilian electronic products.