

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	17mΩ@10V	25A
	23mΩ@4.5V	
-40V	42mΩ@-10V	-20A
	70mΩ@-4.5V	

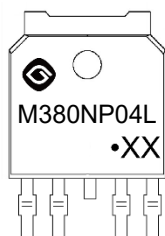
Feature

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

Application

- PWM Applications
- Load Switch
- Power Management

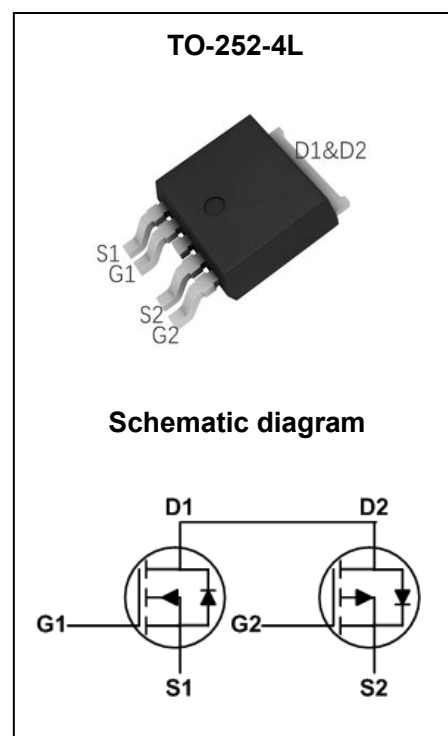
MARKING:



M380NP04L = Device Code
XX = Data Code
Solid Dot = Green Device Indicator

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

Parameter	Symbol	NMOS	PMOS	Unit
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current ¹	$T_C = 25^\circ\text{C}$	25	-20	A
Pulsed Drain Current ²				
Single Pulsed Avalanche Current ^{3,4}	I_{AS}	9	-13	A
Single Pulsed Avalanche Energy ^{3,4}	E_{AS}	25	36	mJ
Power Dissipation ⁶	P_D	41.5	41.5	W
Thermal Resistance from Junction to Ambient ⁷	$R_{\theta JA}$	60	60	$^\circ\text{C/W}$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.9	2.3	$^\circ\text{C/W}$
Junction Temperature	T_J	150	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	-55~ +150	$^\circ\text{C}$



MOSFET ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)
NMOS:

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$			1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
On Characteristics ³						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.7	3.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6A$		17	26	m Ω
		$V_{GS} = 4.5V, I_D = 6A$		23	39	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 20V, V_{GS} = 0V, f = 1MHz$		702		pF
Output Capacitance	C_{oss}			59		
Reverse Transfer Capacitance	C_{rss}			48		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		3.6		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 20V, V_{GS} = 10V, I_D = 6A$		20		nC
Gate-Source Charge	Q_{gs}			2.8		
Gate-Drain Charge	Q_{gd}			6		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20V, V_{GS} = 10V, R_G = 2.5\Omega, R_G = 3\Omega$		5		ns
Turn-On Rise Time	t_r			3		
Turn-Off Delay Time	$t_{d(off)}$			15		
Turn-Off Fall Time	t_f			2		
Source-Drain Diode Characteristics						
Diode Forward Voltage ³	V_{SD}	$V_{GS} = 0V, I_S = 1A$			1.2	V

PMOS:

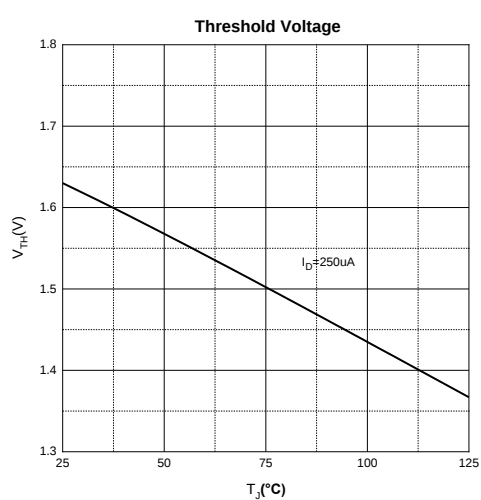
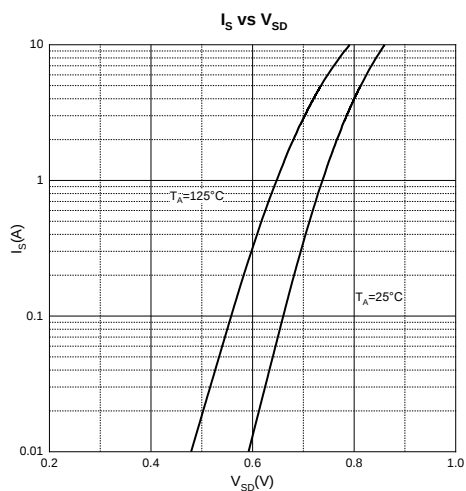
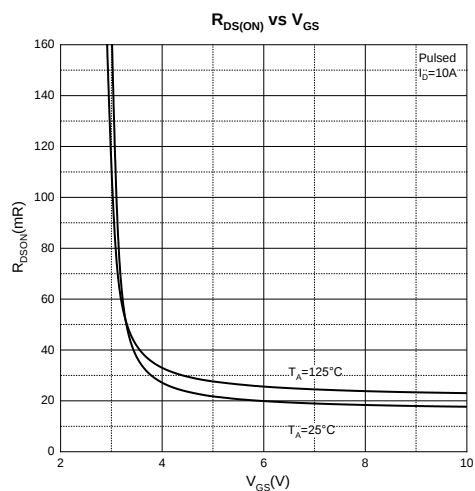
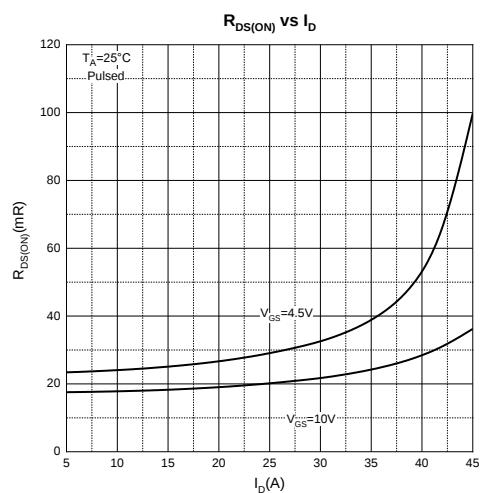
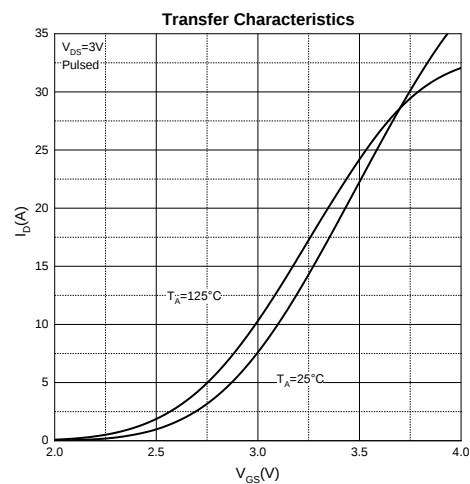
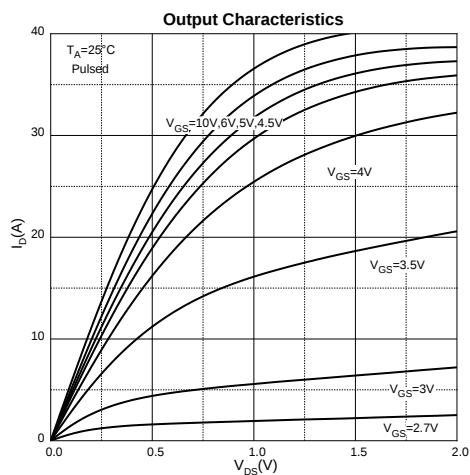
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -40V, V_{GS} = 0V$			-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
On Characteristics ³						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-2.1	-3.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -5A$		42	55	m Ω
		$V_{GS} = -4.5V, I_D = -5A$		70	86	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = -20V, V_{GS} = 0V, f = 1MHz$		671		pF
Output Capacitance	C_{oss}			67		
Reverse Transfer Capacitance	C_{rss}			51		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		24		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = -20V, V_{GS} = -10V, I_D = -5A$		18.4		pC
Gate-Source Charge	Q_{gs}			3.1		
Gate-Drain Charge	Q_{gd}			5.6		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -20V, V_{GS} = -10V,$ $R_G = 2.3\Omega, R_G = 6\Omega$		8		ns
Turn-On Rise Time	t_r			6		
Turn-Off Delay Time	$t_{d(off)}$			20		
Turn-Off Fall Time	t_f			7		
Source-Drain Diode Characteristics						
Diode Forward Voltage ³	V_{SD}	$V_{GS} = 0V, I_S = -1A$			-1.2	V

Notes:

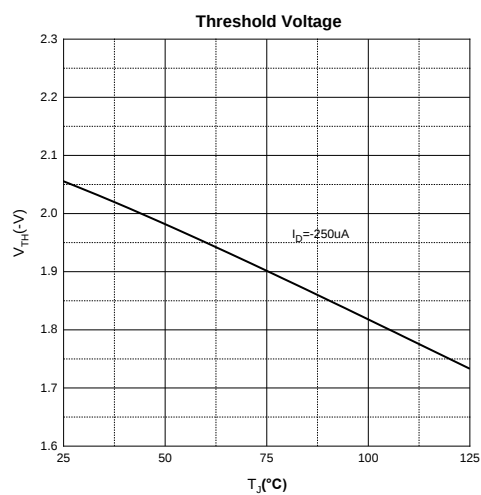
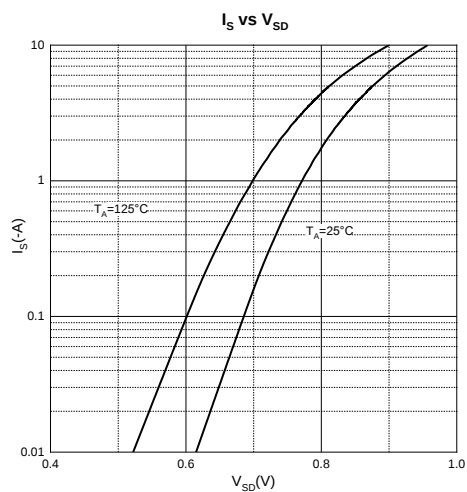
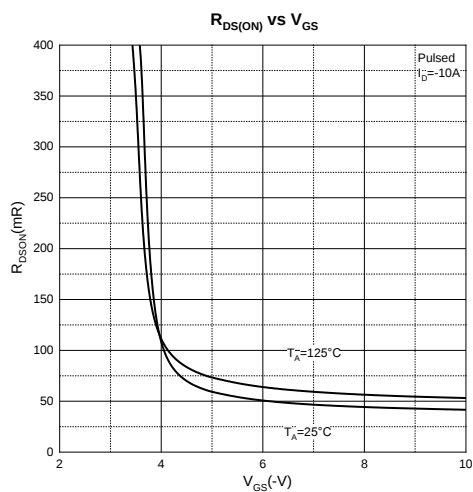
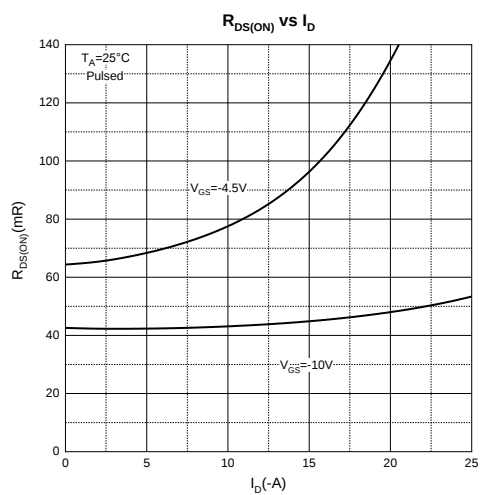
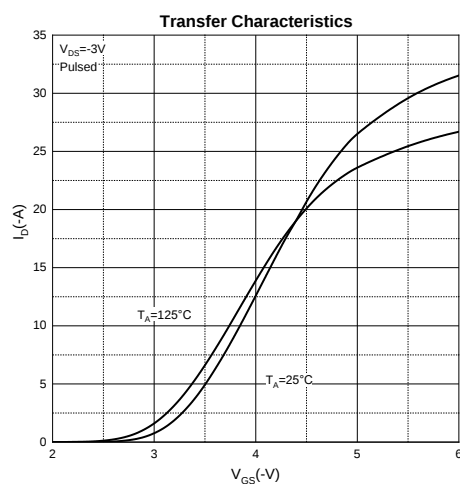
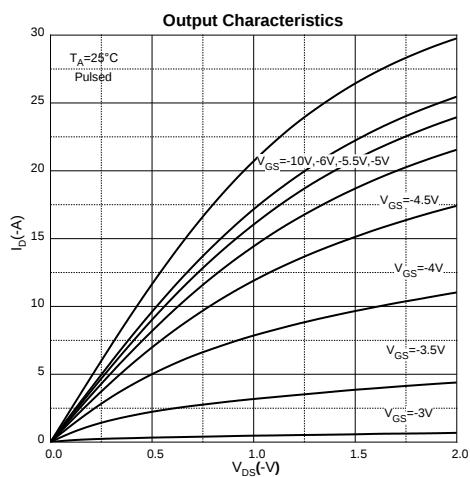
- 1.The maximum current rating is limited by package. And device mounted on a large heatsink.
- 2.Pulse Test: Pulse Width $\leq 10\mu s$, duty cycle $\leq 1\%$.
- 3.EAS condition: $V_{DD} = 20V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
- 4.EAS condition: $V_{DD} = -20V, V_{GS} = -10V, L = 0.5mH, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
- 5.Pulse Test: Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 6.The power dissipation P_D is limited by $T_{J(MAX)} = 150^\circ C$. And device mounted on a large heatsink.
- 7.Device mounted on $1in^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ C$.

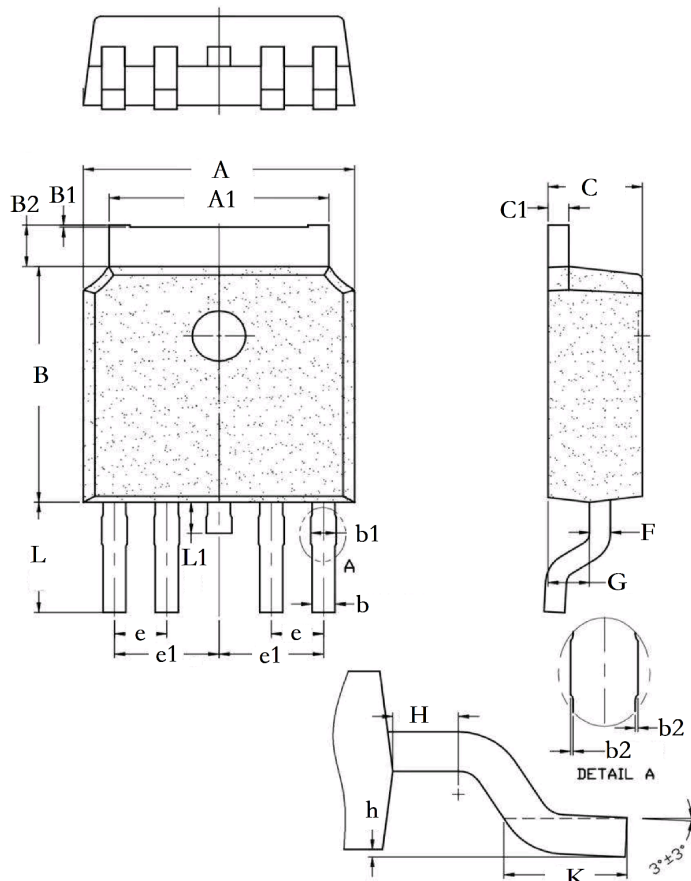
Typical Characteristics

NMOS:



PMOS:



TO-252-4L Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	6.550	6.650	0.258	0.262
A1	5.234	5.434	0.206	0.214
B	6.050	6.150	0.238	0.242
B1	0.000	0.050	0.000	0.002
B2	0.962	1.162	0.038	0.046
C	2.250	2.350	0.089	0.093
C1	0.458	0.558	0.018	0.022
L	2.698	2.998	0.106	0.118
L1	0.700	0.900	0.028	0.035
b	0.510	0.610	0.020	0.024
b1	0.570	0.670	0.022	0.026
b2	0.000	0.050	0.000	0.002
e	1.270TYP		0.050TYP	
e1	2.540TYP		0.100TYP	
F	0.458	0.558	0.018	0.022
G	0.960	1.06	0.038	0.042
H	0.650	0.950	0.026	0.037
h	0.050	0.150	0.002	0.006
K	1.300	1.700	0.051	0.067

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.