

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	12mΩ@10V	28A
	21mΩ@4.5V	
-40V	23mΩ@-10V	-20A
	32mΩ@-4.5V	

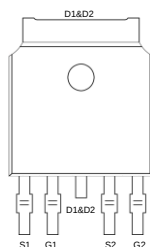
Feature

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

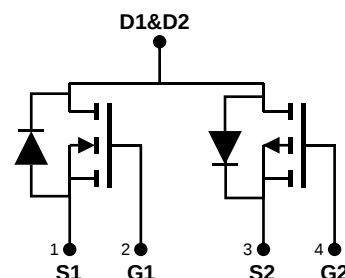
Application

- Synchronous Rectifiers
- Wireless Power
- H-bridge Motor Drive

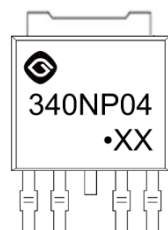
TO-252-4L



Schematic diagram



MARKING:



340NP04 = 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	I_D	28	-20	A
Pulsed Drain Current ²	I_{DM}	112	-80	A
Single Pulsed Avalanche Current ^{3,4}	I_{AS}	20	16	A
Single Pulsed Avalanche Energy ^{3,4}	E_{AS}	100	64	mJ
Power Dissipation ⁶	P_D	18	18	W
Thermal Resistance from Junction to Ambient ⁷	$R_{\theta JA}$	50	50	$^\circ\text{C/W}$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	7	7	$^\circ\text{C/W}$
Junction Temperature	T_J	150	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	-55~ +150	$^\circ\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ 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 = 250μA	40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 32V, V _{GS} = 0V			1	μA
Gate - Body Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
On Characteristics ⁵						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1	1.8	2.5	V
Drain-source On-resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 12A		12	18	mΩ
		V _{GS} = 4.5V, I _D = 10A		21	32	
Forward tranconductance	g _{FS}	V _{DS} = 5V, I _D = 10A	12			S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} = 20V, V _{GS} = 0V, f = 1MHz		872		pF
Output Capacitance	C _{oss}			99		
Reverse Transfer Capacitance	C _{rss}			93		
Gate Resistance	R _g	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz		1.9		Ω
Switching Characteristics						
Total Gate Charge	Q _g	V _{DS} = 32V, V _{GS} = 10V, I _D = 12A		11		pC
Gate-source Charge	Q _{gs}			3		
Gate-drain Charge	Q _{gd}			2.8		
Turn-on Delay Time	t _{d(on)}	V _{DD} = 20V, V _{GS} = 10V, R _L = 2.5Ω R _G = 3Ω		7		ns
Turn-on Rise Time	t _r			12		
Turn-off Delay Ttime	t _{d(off)}			19		
Turn-off Fall Time	t _f			9		
Source - Drain Diode Characteristics						
Diode Forward Voltage ⁵	V _{SD}	V _{GS} = 0V, I _S = 1A			1.2	V

PMOS:

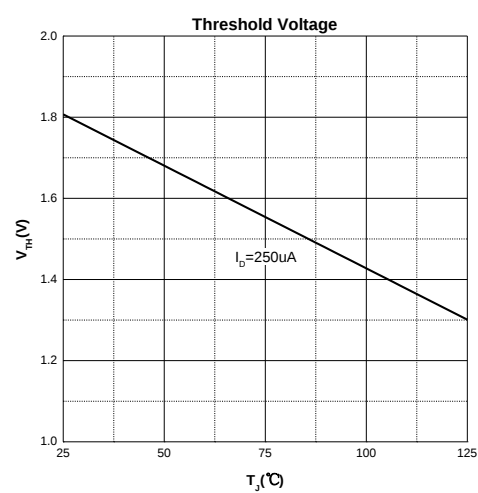
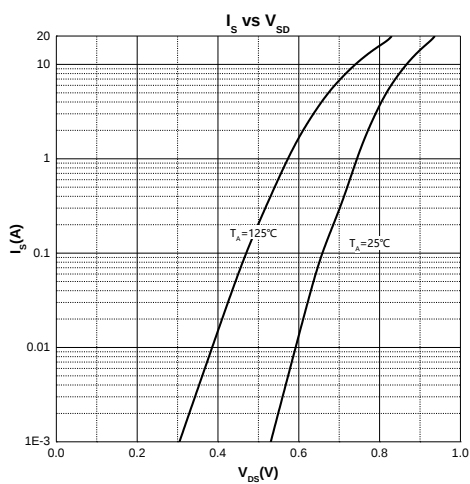
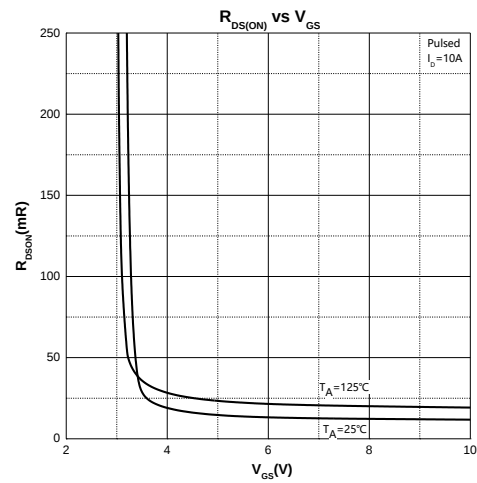
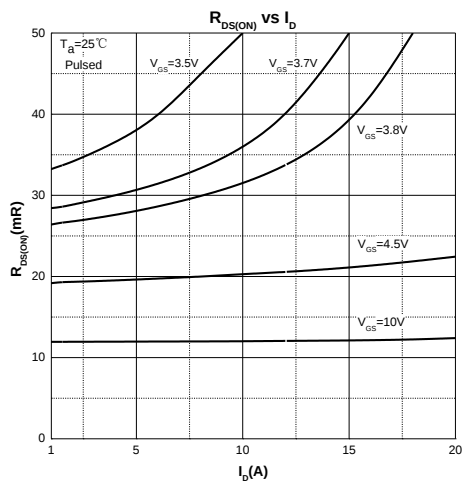
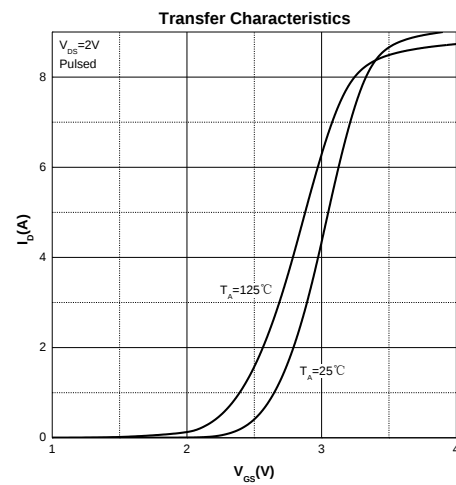
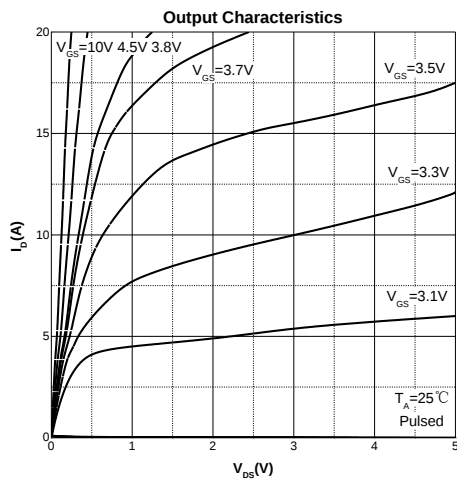
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain - Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -32V, V_{GS} = 0V$			-1	μA
Gate - Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
On Characteristics ⁵						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1	-1.4	-2.5	V
Drain-source On-resistance	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -8A$		23	35	m Ω
		$V_{GS} = -4.5V, I_D = -4A$		32	48	
Forward tranconductance	g_{FS}	$V_{DS} = -5V, I_D = -4A$	10			S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = -20V, V_{GS} = 0V, f = 1MHz$		1125		pF
Output Capacitance	C_{oss}			118		
Reverse Transfer Capacitance	C_{rss}			111		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		5.6		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = -20V, V_{GS} = -10V, I_D = -8A$		18		pC
Gate-source Charge	Q_{gs}			5		
Gate-drain Charge	Q_{gd}			9		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -20V, V_{GS} = -10V, R_L = 2.5\Omega$ $R_G = 3\Omega$		8		ns
Turn-on Rise Time	t_r			30		
Turn-off Delay Ttime	$t_{d(off)}$			27		
Turn-off Fall Time	t_f			21		
Source - Drain Diode Characteristics						
Diode Forward Voltage ⁵	V_{SD}	$V_{GS} = 0V, I_S = -1A$			-1.2	V

Notes :

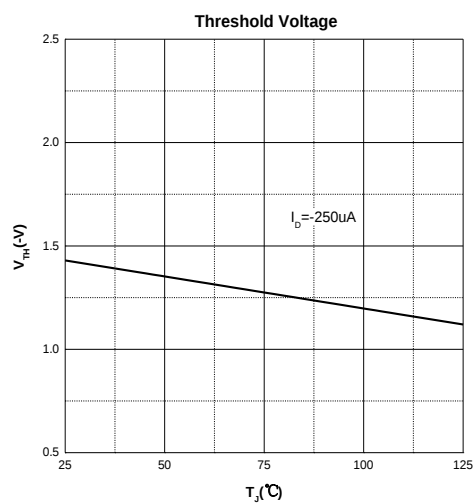
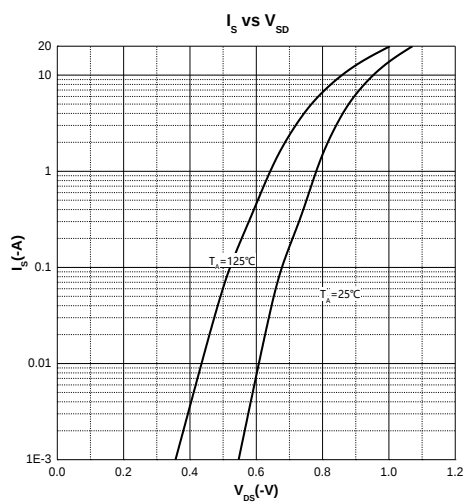
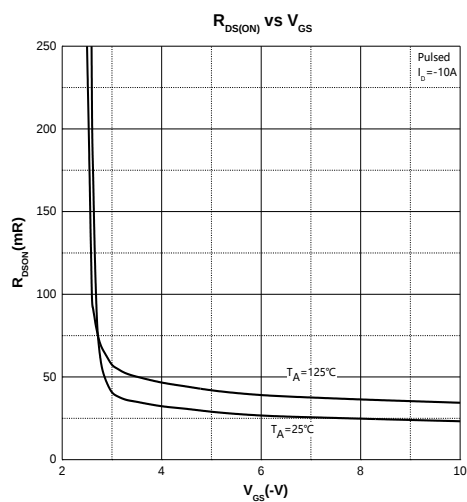
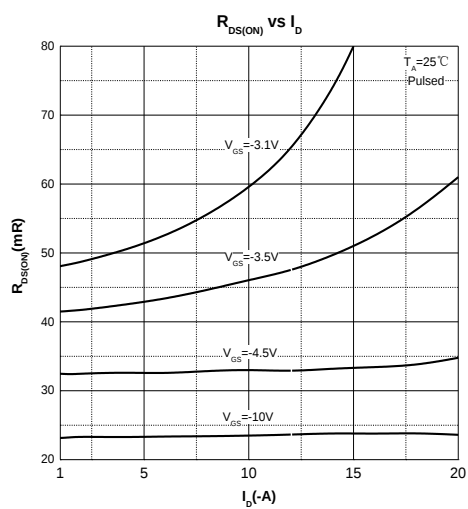
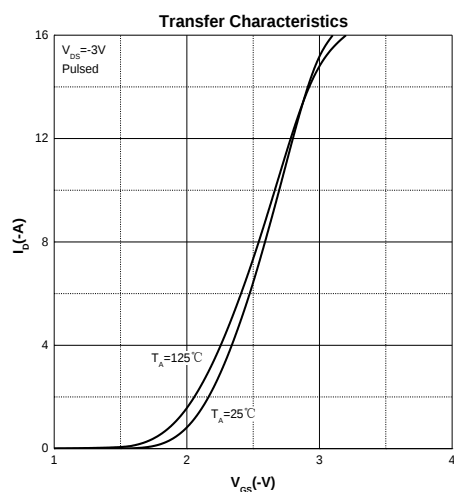
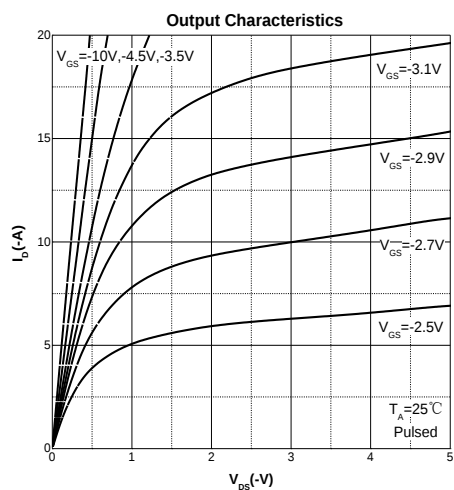
1. The maximum current rating is limited by package. And device mounted on a large heatsink
2. Pulse Test : Pulse Width $\leq 10\mu s$, duty cycle $\leq 1\%$.
3. E_{AS} condition: $V_{DD} = 20V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
4. E_{AS} condition: $V_{DD} = -20V, V_{GS} = -10V, L = 0.5mH, R_G = 25\Omega$ 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 $T_A = 25^\circ C$.

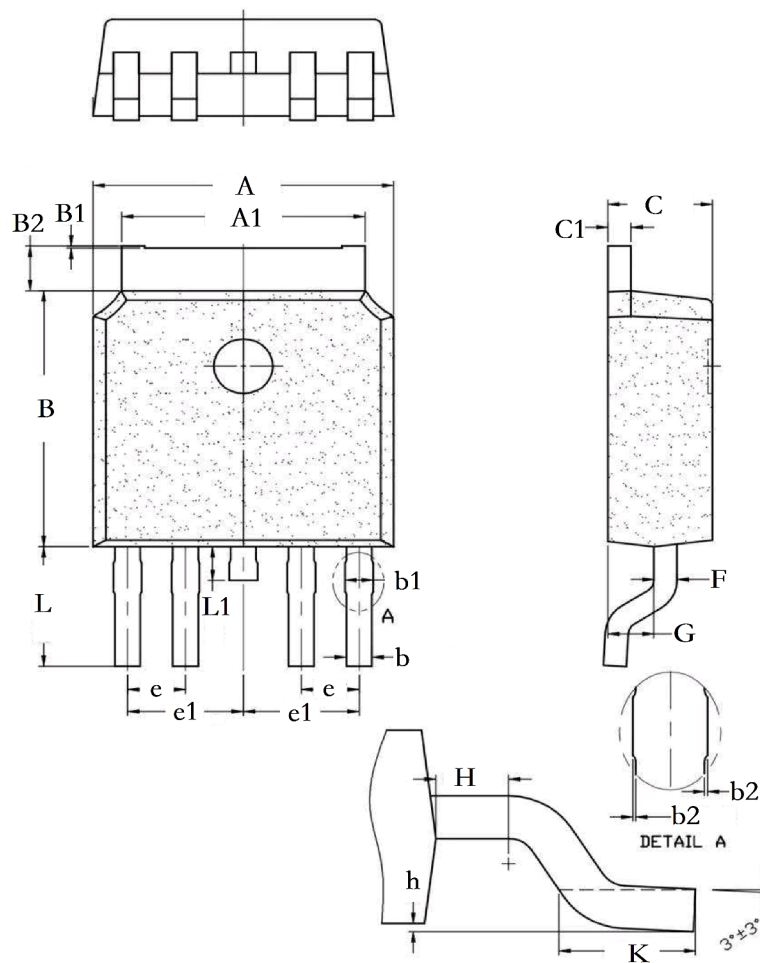
Typical Characteristics

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