



Product Summary

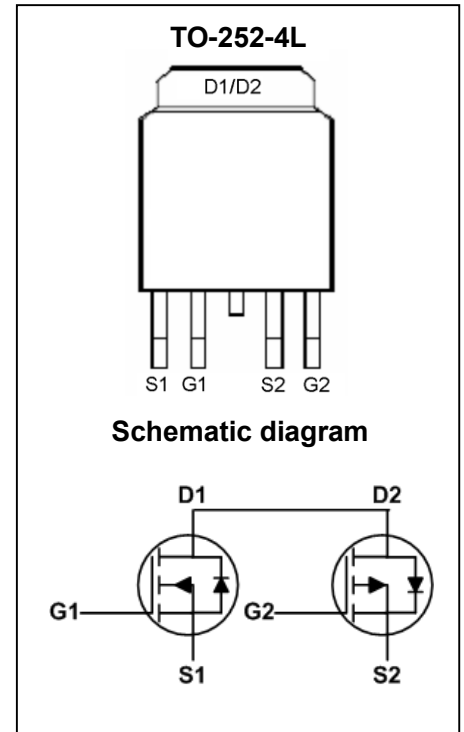
$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	12mΩ@10V	30A
	18mΩ@4.5V	
-40V	25mΩ@-10V	-28A
	33mΩ@-4.5V	

Feature

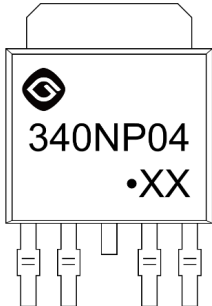
- Trench Technology Power MOSFET
- Low $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance

Application

- PWM Applications
- Loas Switch
- Power Management



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	30	-28	A
	$T_C = 25^\circ\text{C}$			
Pulsed Drain Current ²	I_{DM}	120	-112	A
Single Pulsed Avalanche Current ^{3,4}	I_{AS}	16	17	A
Single Pulsed Avalanche Energy ^{3,4}	E_{AS}	63	72	mJ
Power Dissipation ⁶	P_D	22.7	25	W
Thermal Resistance from Junction to Ambient ⁷	$R_{\theta JA}$	60	60	$^\circ\text{C/W}$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	5.5	5	$^\circ\text{C/W}$
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	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	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 Characteristics³						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.6	2.5	V
Drain-source On-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 12A$		12	18	m Ω
		$V_{GS} = 4.5V, I_D = 10A$		18	32	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$		926.6		pF
Output Capacitance	C_{oss}			98.7		
Reverse Transfer Capacitance	C_{rss}			90.3		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		2.2		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 15V, V_{GS} = 10V, I_D = 7A$		19.9		nC
Gate-source Charge	Q_{gs}			2.8		
Gate-drain Charge	Q_{gd}			4.8		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 20V, V_{GS} = 10V, I_D = 1A,$ $R_G = 3.3\Omega$		8.9		ns
Turn-on Rise Time	t_r			2.2		
Turn-off Delay Time	$t_{d(off)}$			41		
Turn-off Fall Time	t_f			2.7		
Source - Drain Diode Characteristics						
Diode Forward Voltage ³	V_{SD}	$V_{GS} = 0V, I_S = 1A$			1.2	V

PMOS:

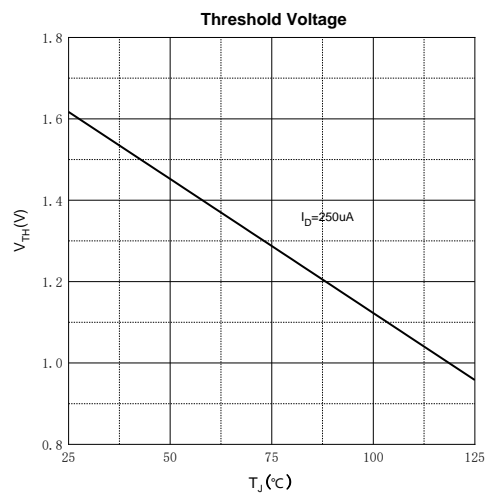
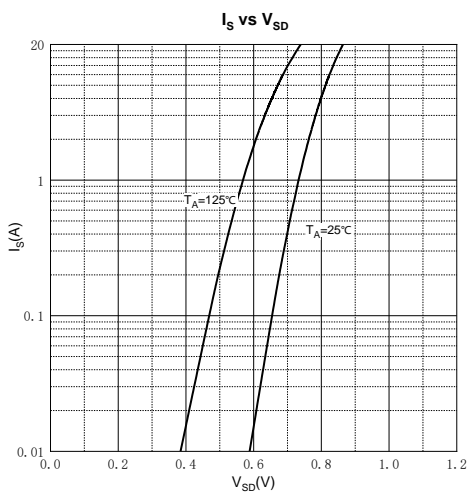
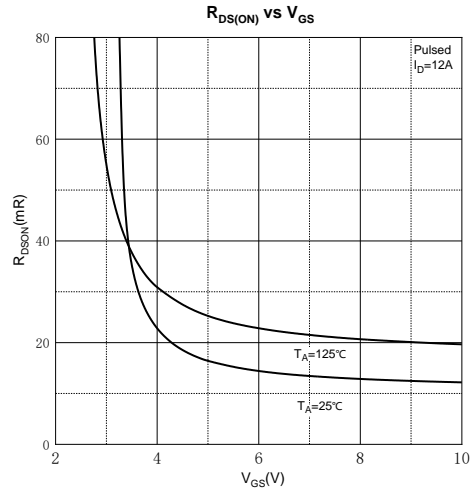
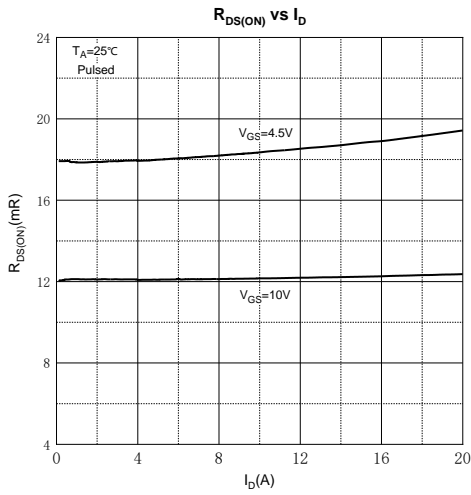
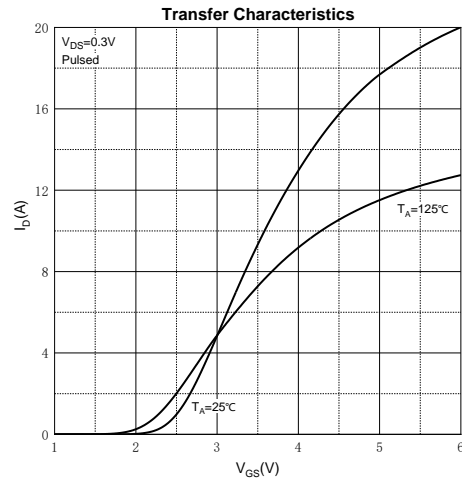
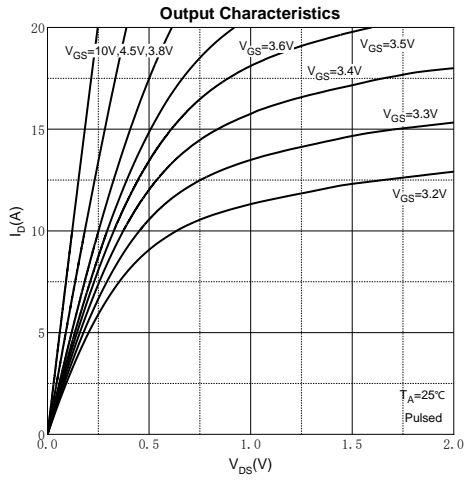
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain - Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -40V, V_{GS} = 0V$			-1	μA
Gate - Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
On Characteristics³						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.6	-2.5	V
Drain-source On-resistance	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -8.0A$		25	35	m Ω
		$V_{GS} = -4.5V, I_D = -4.0A$		33	48	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = -20V, V_{GS} = 0V, f = 1MHz$		1239		pF
Output Capacitance	C_{oss}			117.1		
Reverse Transfer Capacitance	C_{rss}			106.3		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		6		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = -20V, V_{GS} = -10V, I_D = -12A$		25.1		pC
Gate-source Charge	Q_{gs}			3.6		
Gate-drain Charge	Q_{gd}			5.3		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15V, V_{GS} = -10V, I_D = -1A,$ $R_G = 3.3\Omega$		19.2		ns
Turn-on Rise Time	t_r			12.8		
Turn-off Delay Time	$t_{d(off)}$			48.6		
Turn-off Fall Time	t_f			4.6		
Source - Drain Diode Characteristics						
Diode Forward Voltage ³	V_{SD}	$V_{GS} = 0V, I_S = -1A$			-1.2	V

Notes :

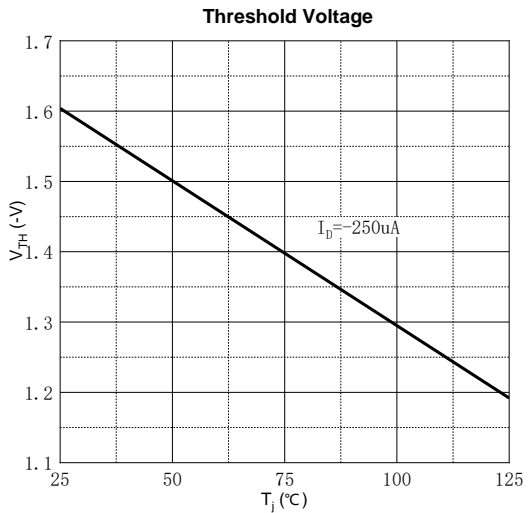
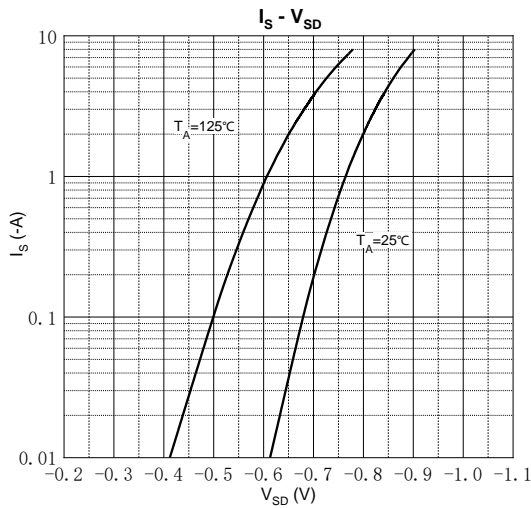
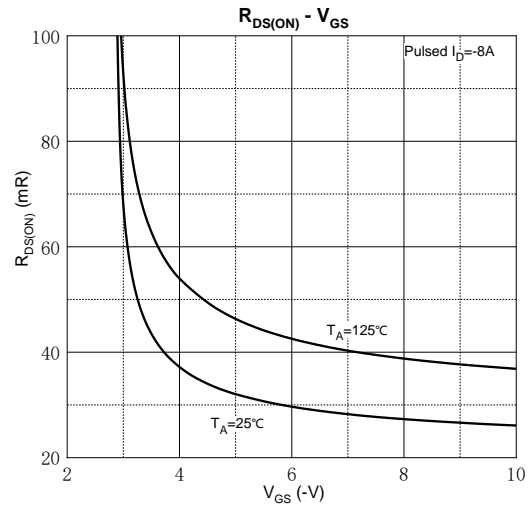
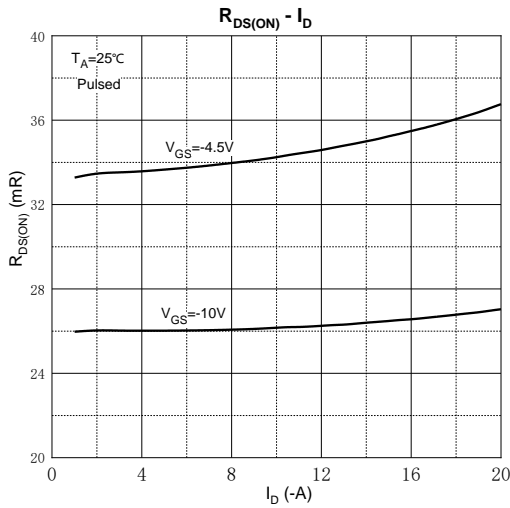
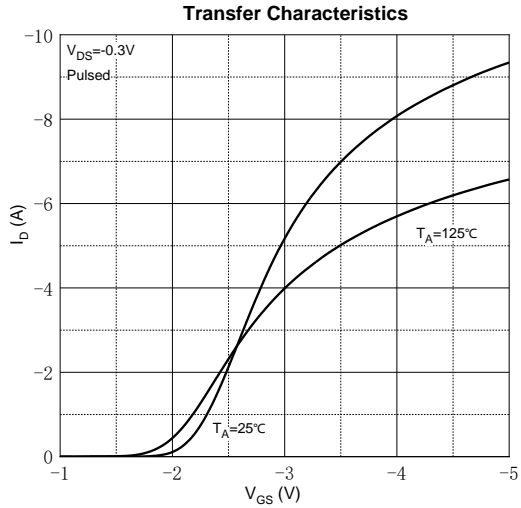
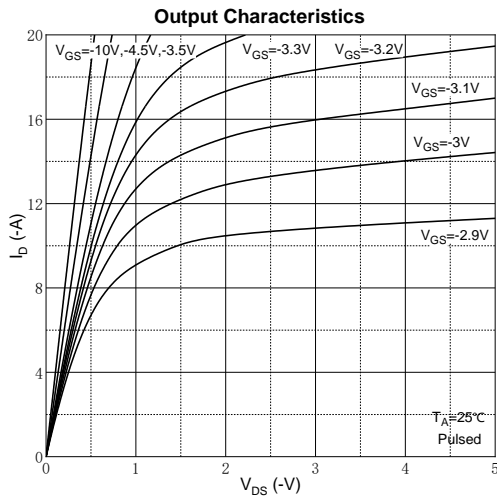
- 1.The maximum current rating is limited by package.And device mounted on a large heatsink
- 2.Pulse Test : Pulse Width $\leq 10\mu s$, duty cycle $\leq 1\%$.
- 3.EAS condition: $V_{DD} = 20V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
- 4.EAS condition: $V_{DD} = -20V, V_{GS}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

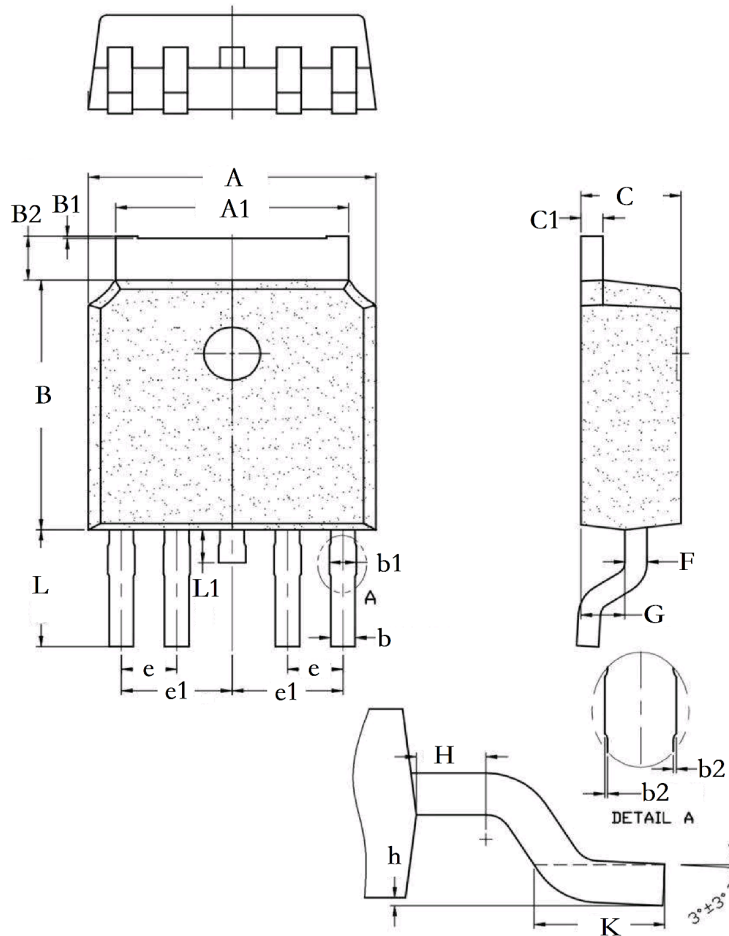
NMOS:



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