



Product Summary

V _{(BR)DSS}	R _{DS(on)TYP}	I _D
40V	28mΩ@10V	6A
	38mΩ@4.5V	
-40V	56mΩ@-10V	-5A
	75mΩ@-4.5V	

Feature

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

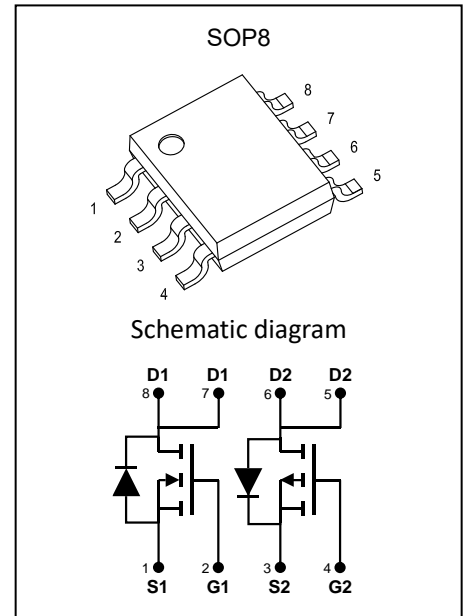
Application

- Power Switching Application

MARKING:



560NP04L = Device Code
XX = Date Code
Solid Dot = Green Indicator



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Parameter	Symbol	Value	Value	Unit	
Drain - Source Voltage	V _{DS}	40	-40	V	
Gate - Source Voltage	V _{GS}	±20	±20	V	
Continuous Drain Current ¹	T _A = 25°C	I _D	6	-5	A
	T _A = 100°C	I _D	4	-3	A
Pulsed Drain Current ²	I _{DM}	24	-20	A	
Single Pulsed Avalanche Current ³	I _{AS}	9	-8	A	
Single Pulsed Avalanche Energy ³	E _{AS}	20	16	mJ	
Power Dissipation ⁵	T _A = 25°C	P _D	2	W	
Thermal Resistance from Junction to Ambient ⁶	R _{θJA}	60		°C/W	
Junction Temperature	T _J	150	150	°C	
Storage Temperature	T _{STG}	-55~ +150	-55~ +150	°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 Characteristics⁴						
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	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 5A$		28	36	m Ω
		$V_{GS} = 4.5V, I_D = 3A$		38	49	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 20V, V_{GS} = 0V, f = 1MHz$		544		pF
Output Capacitance	C_{oss}			47		
Reverse Transfer Capacitance	C_{rss}			38		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		2.6		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 20V, V_{GS} = 10V, I_D = 5A$		12		nC
Gate-source Charge	Q_{gs}			1.7		
Gate-drain Charge	Q_{gd}			2.8		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 20V, V_{GS} = 10V, I_D = 6A,$ $R_G = 3\Omega$		8		ns
Turn-on Rise Time	t_r			16		
Turn-off Delay Time	$t_{d(off)}$			27		
Turn-off Fall Time	t_f			15		
Source - Drain Diode Characteristics						
Diode Forward Voltage ⁴	V_{SD}	$V_{GS} = 0V, I_S = 3A$			1.2	V

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

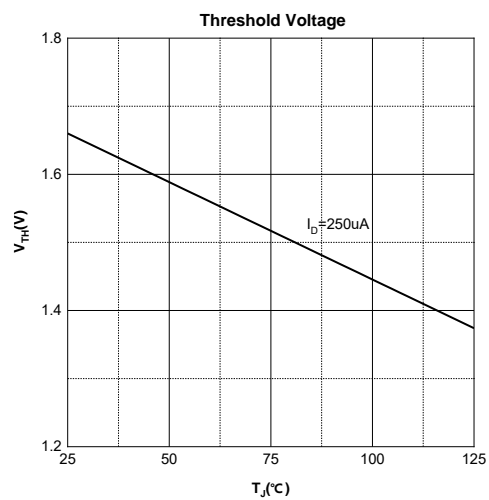
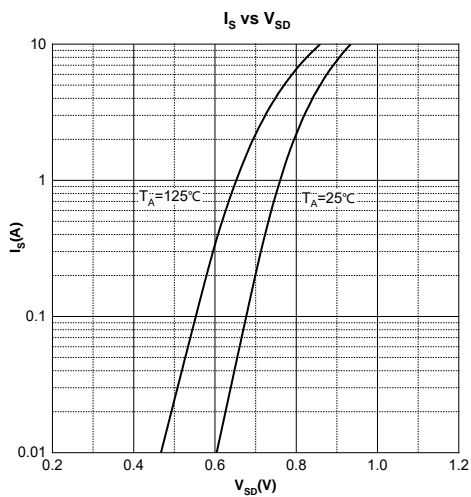
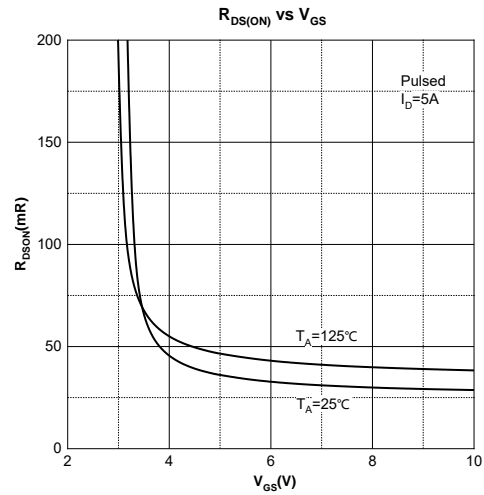
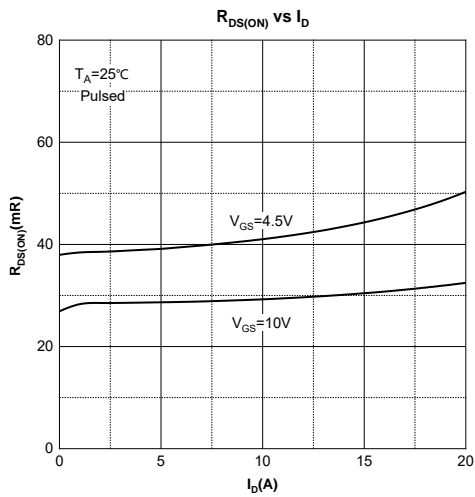
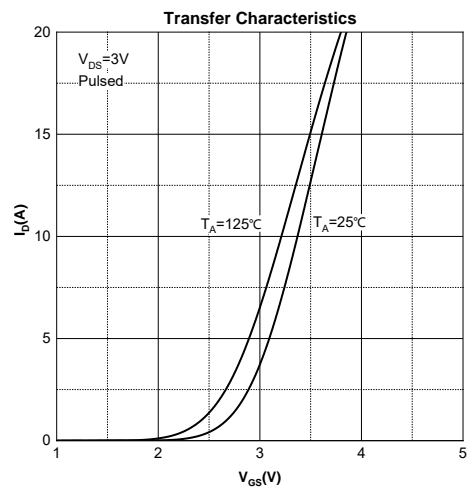
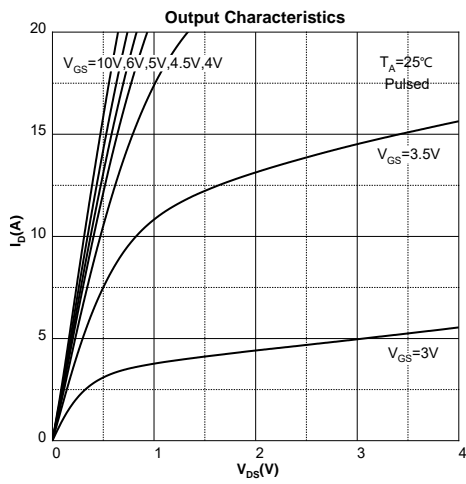
PMOS:

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 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	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -5A$		56	88	m Ω
		$V_{GS} = -4.5V, I_D = -4A$		75	100	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = -20V, V_{GS} = 0V, f = 1MHz$		441		pF
Output Capacitance	C_{oss}			51		
Reverse Transfer Capacitance	C_{rss}			42		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		33		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = -20V, V_{GS} = -10V, I_D = -2A$		10		nC
Gate-source Charge	Q_{gs}			1.3		
Gate-drain Charge	Q_{gd}			2.4		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15V, V_{GS} = -10V, I_D = -5A,$ $R_G = 3\Omega$		21		ns
Turn-on Rise Time	t_r			15		
Turn-off Delay Time	$t_{d(off)}$			53		
Turn-off Fall Time	t_f			12		
Source - Drain Diode Characteristics						
Diode Forward Voltage ⁴	V_{SD}	$V_{GS} = 0V, I_S = -4A$			-1.2	V

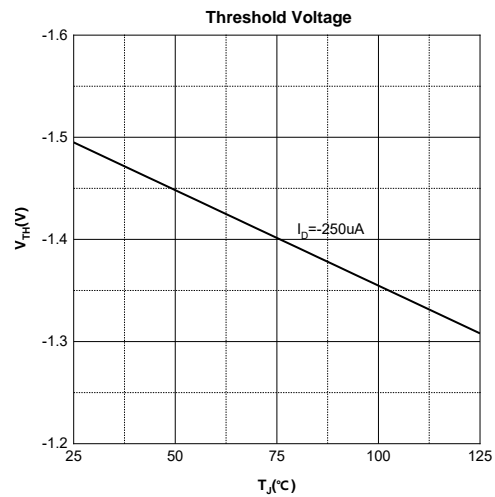
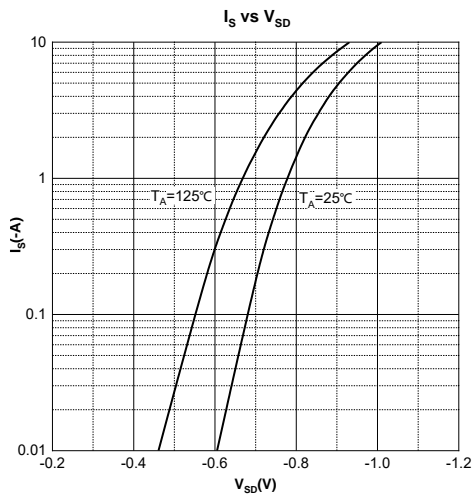
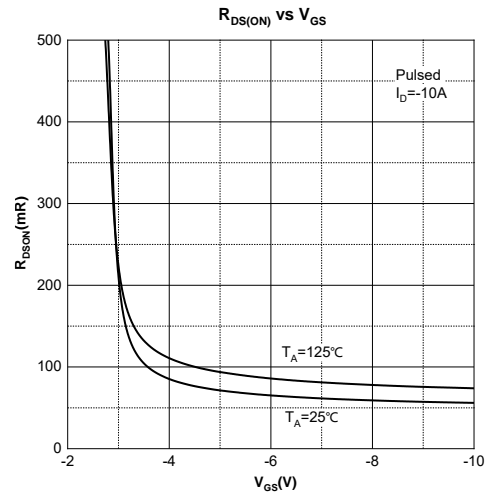
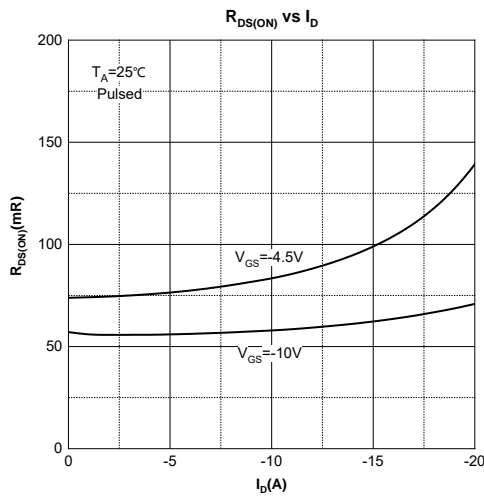
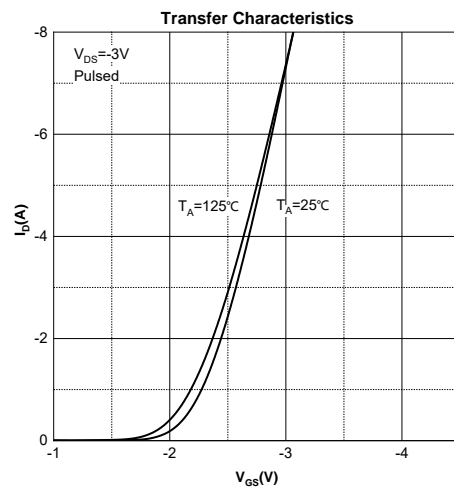
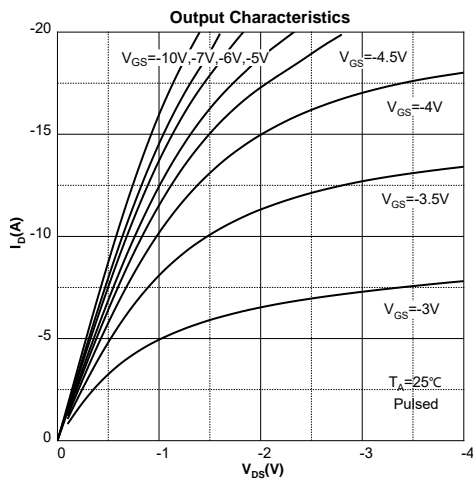
Notes :

- 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: $V_{DD} = \pm 20V, V_{GS} = \pm 10V, L = 0.5mH, R_G = 25\Omega$ 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 $T_A = 25^\circ\text{C}$.

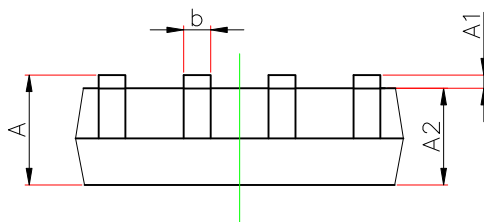
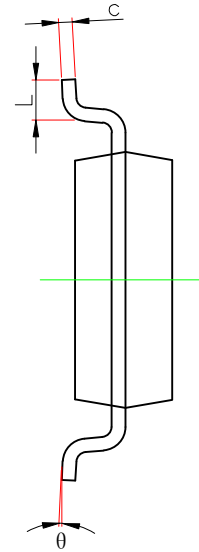
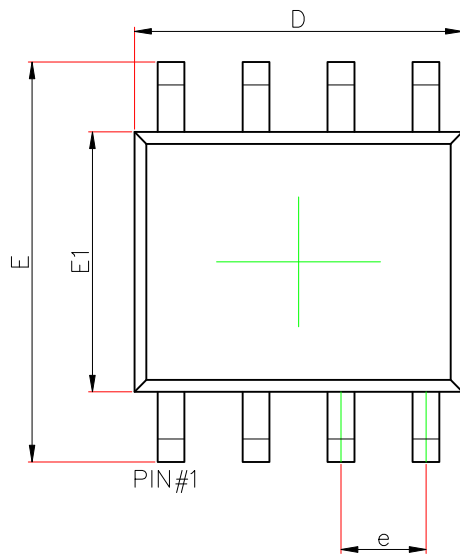
Typical Characteristics



Typical Characteristics



SOP8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.156	0.250	0.006	0.010
D	4.700	5.100	0.185	0.201
e	1.270(BSC)		0.050(BSC)	
E	5.800	6.200	0.228	0.244
E1	3.700	4.100	0.146	0.161
L	0.400	1.270	0.016	0.05
θ	0°	8°	0°	8°