N-Channel Enhancement Mode Power MOSFET

Description

The PES060N04GT uses deep trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

General Features

- V_{DS} = 40V, I_D = 54A

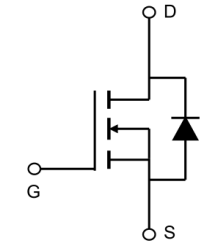
  $R_{DS(ON)}$ < 4.6mΩ @ V_{GS}=10V

  $R_{DS(ON)}$ < 8mΩ @ V_{GS}=4.5V

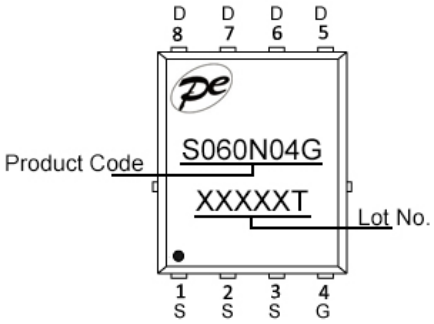
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

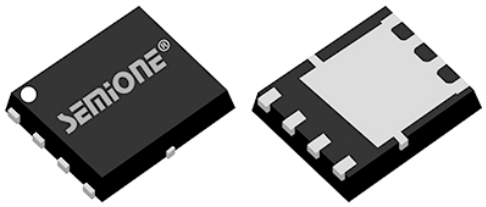
- Power Tools
- Load Switch
- DC-DC Converter



Schematic diagram



Marking and pin assignment



DFN5x6-8L

Absolute Maximum Ratings (TC=25℃ unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	54	A
Drain Current-Continuous (T_C=100℃)	I_D	40	A
Pulsed Drain Current (Note 1)	I_{DM}	216	A
Maximum Power Dissipation	P_D	39	W
Single Pulsed Avalanche Energy (L=0.1mH)	E_{AS}	68	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.2	℃/W

Electrical Characteristics (TC=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	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}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.2	1.9	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=20A	-	3.8	4.6	mΩ
		V_{GS}=4.5V,I_D=15A	-	6	8	mΩ
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V, F=1.0MHz	-	1200	-	pF
Output Capacitance	C_{oss}		-	500	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	20	-	pF
Gate Resistance	R_g	F=1.0MHz	-	0.9	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V,I_D=20A,R_L=1Ω, V_{GS}=10V,R_G=10Ω	-	14.2	-	nS
Turn-on Rise Time	t_r		-	6.4	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	41.6	-	nS
Turn-Off Fall Time	t_f		-	14	-	nS
Total Gate Charge	Q_g	V_{DS}=20V,I_D=20A,V_{GS}=10V	-	20.6	-	nC
Gate-Source Charge	Q_{gs}		-	3.6	-	nC
Gate-Drain Charge	Q_{gd}		-	4.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=20A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	54	A
Body Diode Reverse Recovery Time	t_{rr}	I_F=40A,dI/dt=100A/μs	-	37.8	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	29.7	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to product.

Typical Electrical and Thermal Characteristics

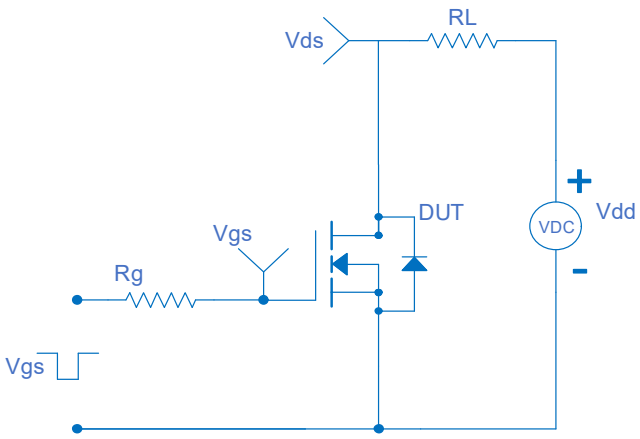


Figure 1 Switching Test Circuit

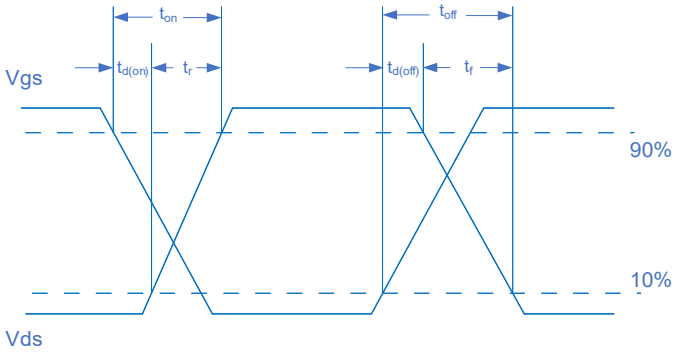
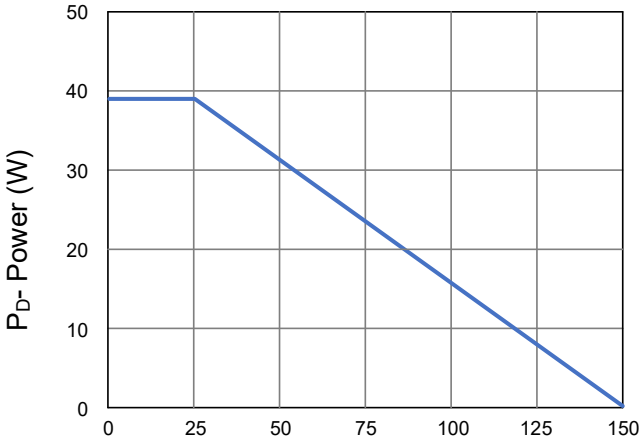
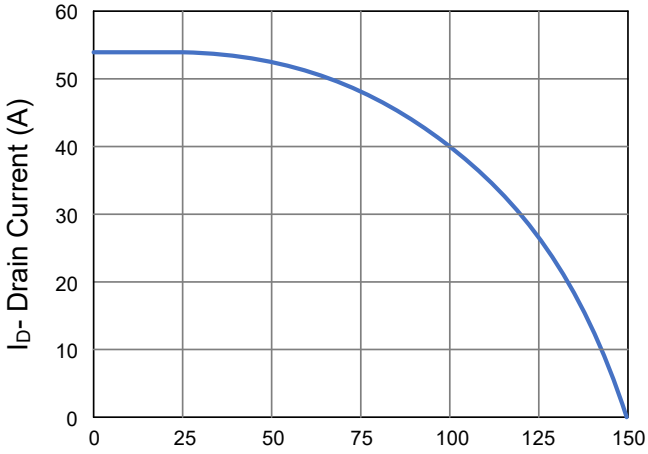


Figure 2 Switching Waveform



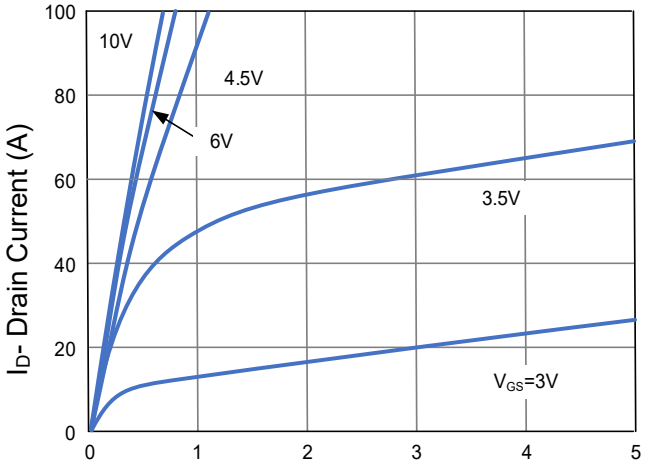
TJ-Junction Temperature (℃)

Figure 3 Power De-rating



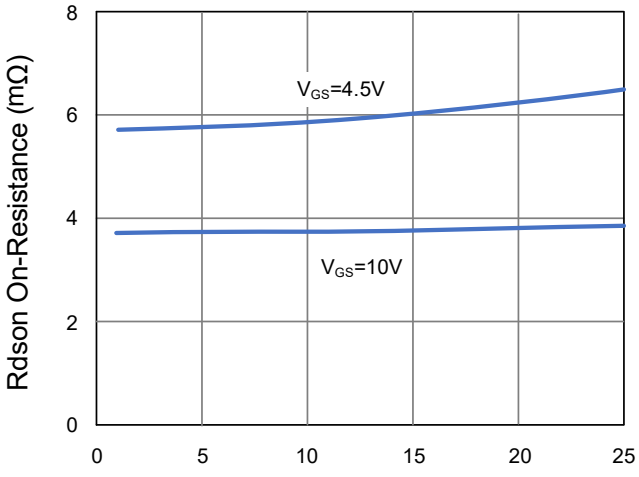
TJ-Junction Temperature (℃)

Figure 4 Drain Current



Vds Drain-Source Voltage (V)

Figure 5 Output Characteristics



ID- Drain Current (A)

Figure 6 Rdson vs Drain Current

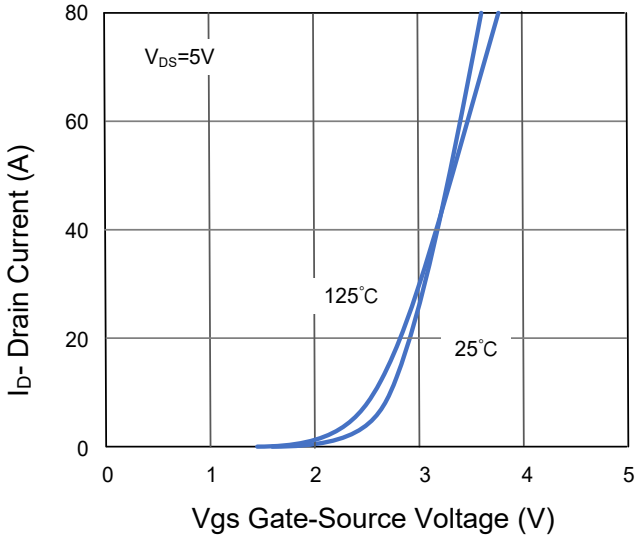


Figure 7 Transfer Characteristics

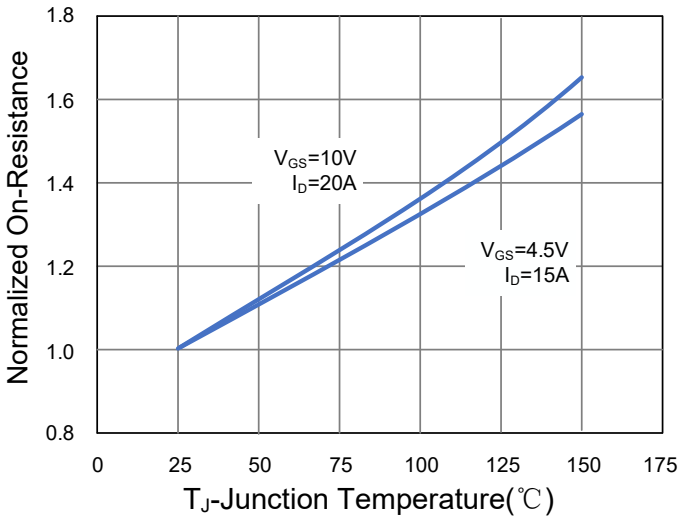


Figure 8 Rdson vs Junction Temperature

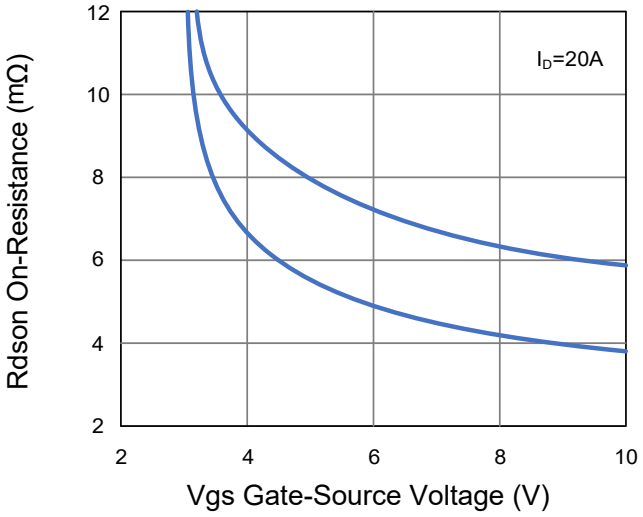


Figure 9 Rdson vs Vgs

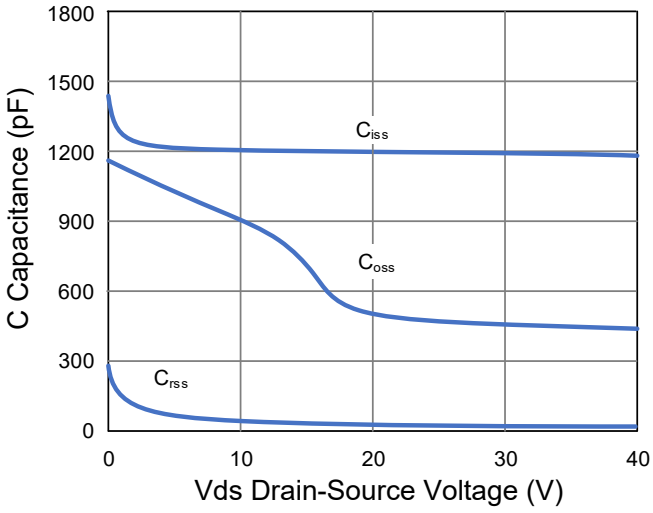


Figure 10 Capacitance vs Vds

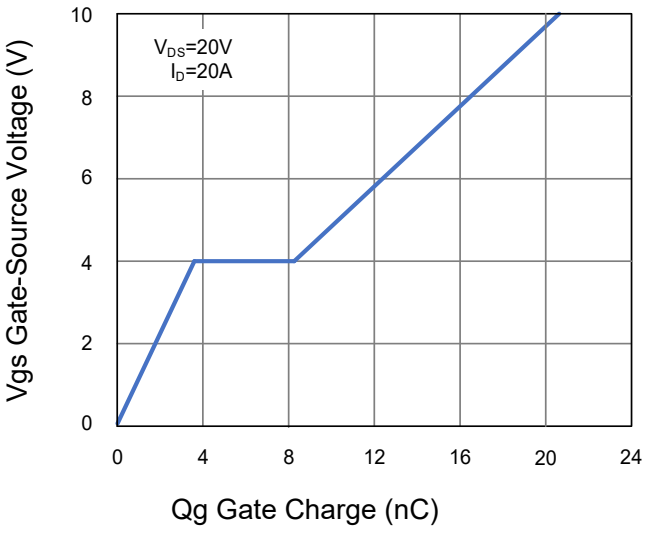


Figure 11 Gate Charge

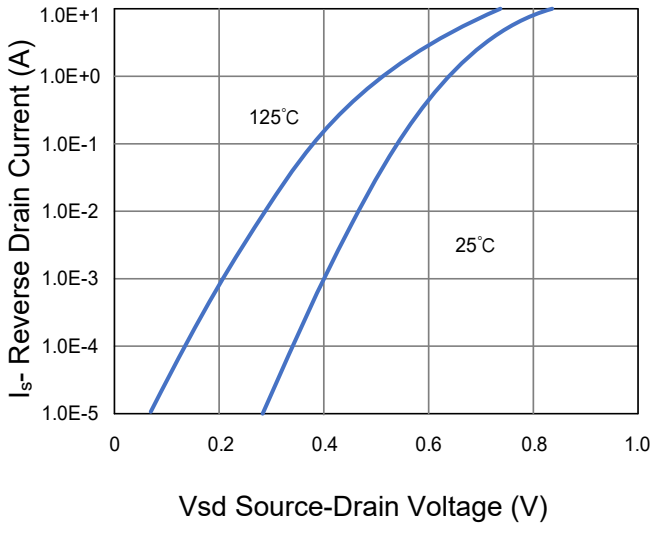


Figure 12 Source- Drain Diode Forward

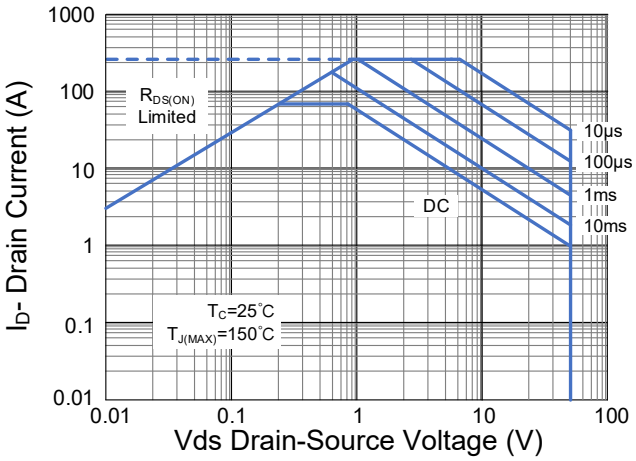


Figure 13 Safe Operation Area

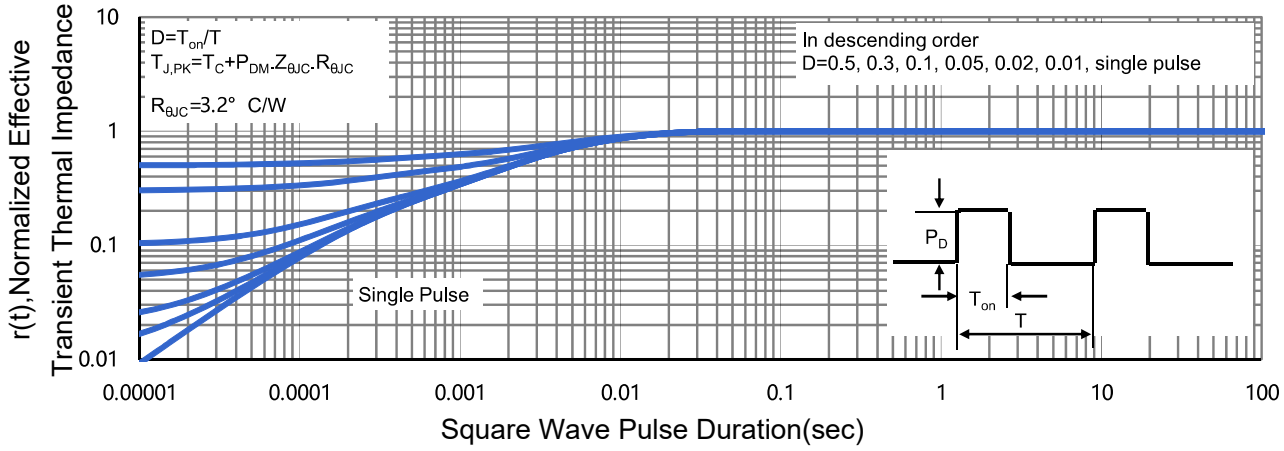
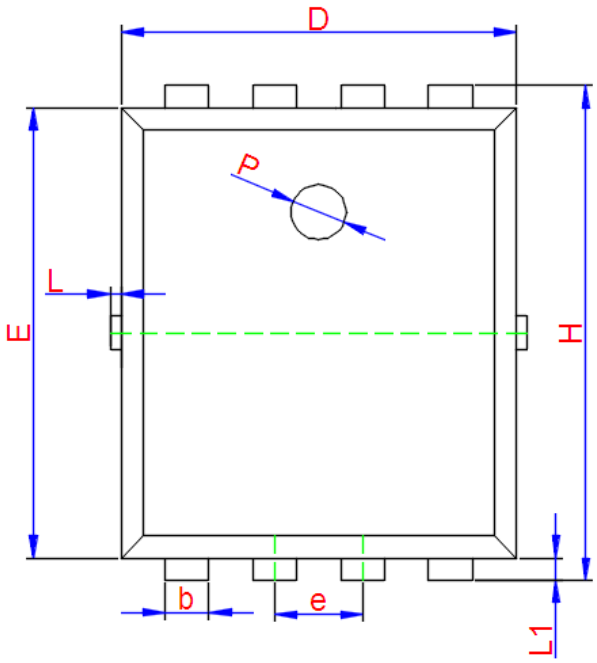
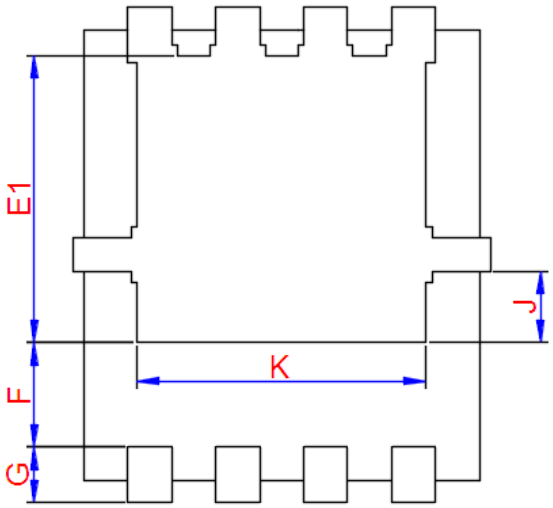
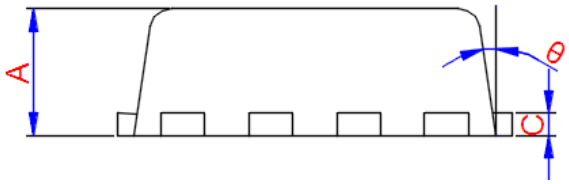


Figure 14 Normalized Maximum Transient Thermal Impedance

DFN5x6-8L Package Information







Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.800	1.000	1.170
b	0.350	0.420	0.490
c		0.254TYP.	
D	4.850	5.000	5.100
e		1.270TYP.	
E	5.700	5.800	5.900
E1		3.400TYP.	
F		1.400TYP.	
G		0.600TYP.	
H	5.950	6.080	6.200
J		0.950TYP.	
K		4.000TYP	
L	-	-	0.150
L1	0.100	0.140	0.180
P		1.000TYP.	
θ	6°	10°	14°