KSN60P04X

-40V P-Channel MOSFETs

General Description

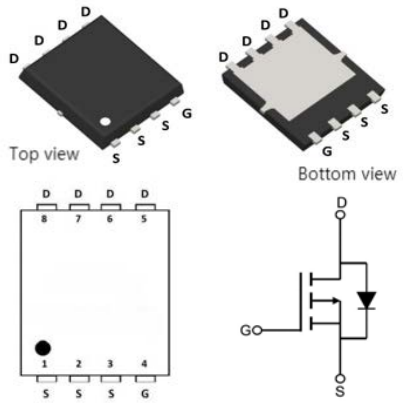
The KSN60P04X series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible onresistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

BVDSS	RDSON	ID
-40V	11 mΩ	-60A

Features

- -40V,-60A, RDS(ON) =13mΩ@VGS = -10V
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

PDFN5X6 Pin Configuration



Applications

- Motor Drive
- Power Tools
- LED Lighting

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current – Continuous (T_C=25℃)	-60	A
	Drain Current – Continuous (T_C=100℃)	-38	A
I_{DM}	Drain Current – Pulsed[1]	-200	A
EAS	Single Pulse Avalanche Energy[2]	130	mJ
IAS	Single Pulse Avalanche Current[2]	-51	A
P_D	Power Dissipation (T_C=25℃)	80	W
	Power Dissipation – Derate above 25℃	0.78	W/℃
T_{STG}	Storage Temperature Range	-50 to 150	℃
T_J	Operating Junction Temperature Range	-50 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	1.29	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted) Off

Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-40	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-40V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-32V , V_{GS}=0V , T_J=125℃	---	---	-10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V , I_D=-15A	---	11.0	13	mΩ
		V_{GS}=-4.5V , I_D=-8A	---	14.0	18.0	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.8	-2.5	V
gfs	Forward Transconductance	V_{DS}=-10V , I_D=-8A	---	17	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[3, 4]	V_{DS}=-20V , V_{GS}=-10V , I_D=-30A	---	41	65	nC
Q_{gs}	Gate-Source Charge[3, 4]		---	8.2	15	
Q_{gd}	Gate-Drain Charge[3, 4]		---	7.5	12	
$T_{d(on)}$	Turn-On Delay Time[3, 4]	V_{DD}=-20V , V_{GS}=-10V , R_G=6Ω , I_D=-30A	---	10	15	ns
T_r	Rise Time[3, 4]		---	20	30	
$T_{d(off)}$	Turn-Off Delay Time[3, 4]		---	15	25	
T_f	Fall Time[3, 4]		---	25	40	
C_{iss}	Input Capacitance	V_{DS}=-20V , V_{GS}=0V , F=1MHz	---	3350	4130	pF
C_{oss}	Output Capacitance		---	250	375	
C_{rss}	Reverse Transfer Capacitance		---	175	265	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-60	A
I_{SM}	Pulsed Source Current		---	---	-120	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V
t_{rr}	Reverse Recovery Time	V_R=-30V, I_S=-10A , di/dt=100A/μs, T_J=25℃	---	45	---	ns
Q_{rr}	Reverse Recovery Charge		---	30	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=-25V,V_{GS}=-10V,L=0.1mH,I_{AS}=-51A.,R_G=25Ω,Starting T_J=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

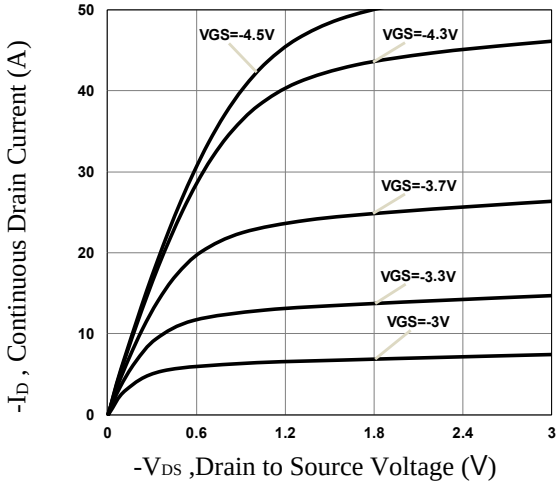


Fig.1 Typical Output Characteristics

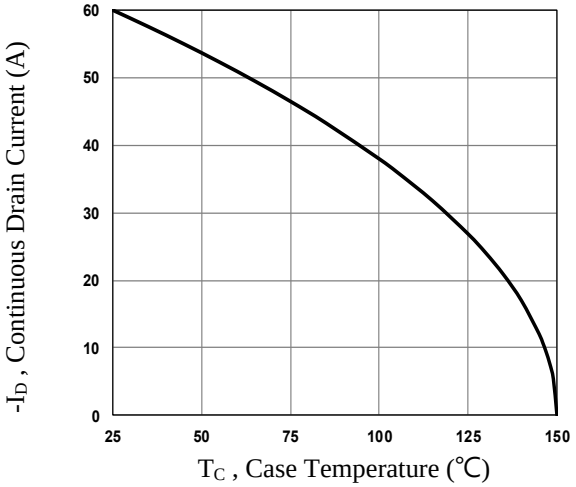


Fig.2 Continuous Drain Current vs. T_C

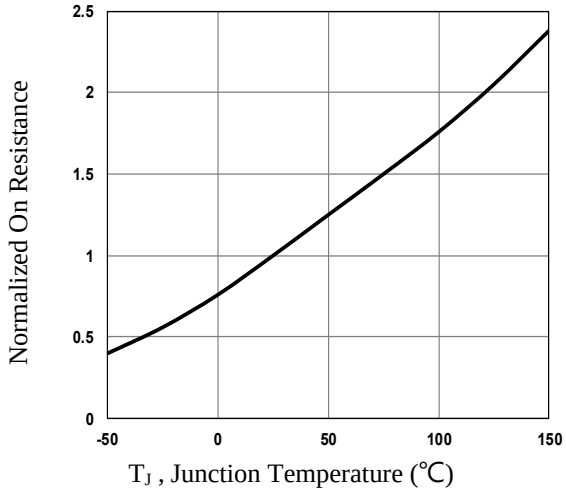


Fig.3 Normalized RDSON vs. T_J

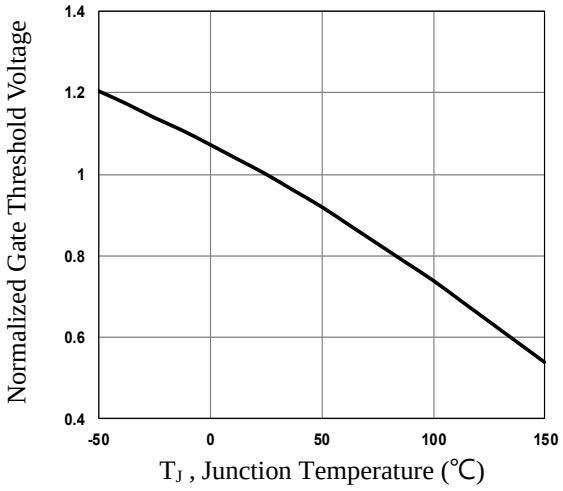


Fig.4 Normalized V_{th} vs. T_J

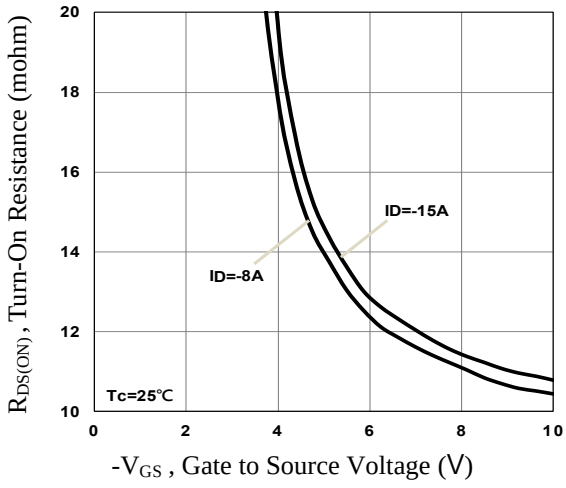


Fig.5 Turn-On Resistance vs. V_{GS}

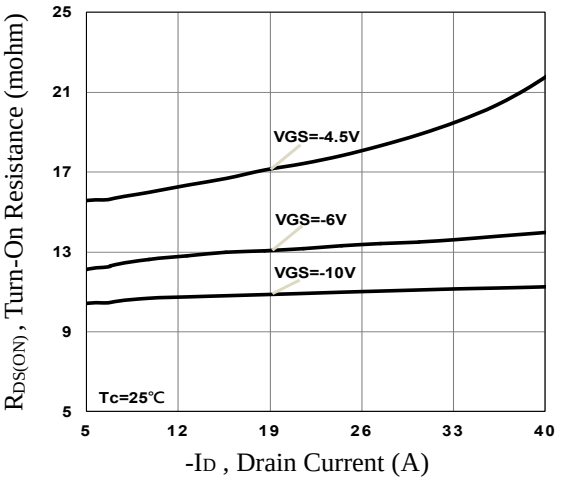


Fig.6 Turn-On Resistance vs. ID

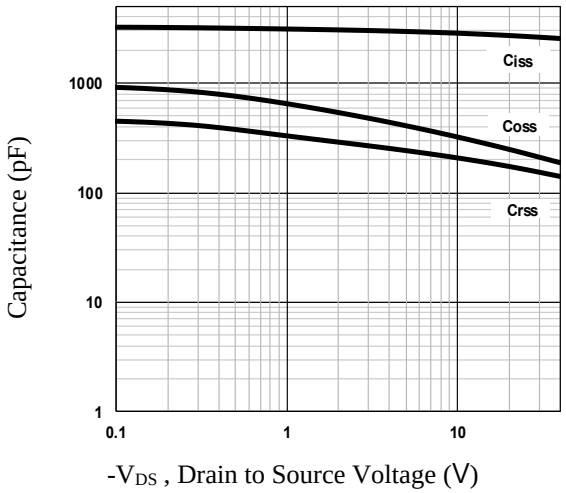


Fig.7 Capacitance Characteristics

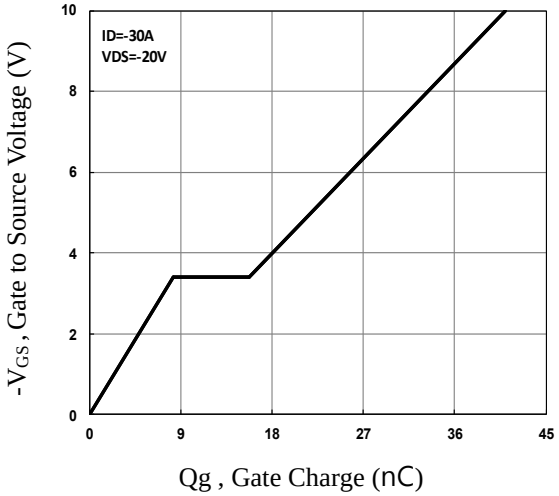


Fig.8 Gate Charge Characteristics

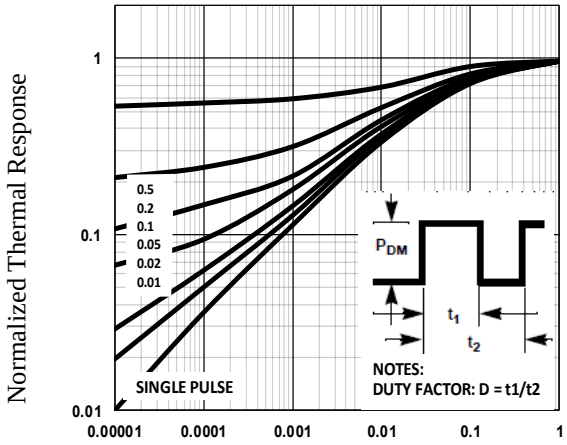


Fig.9 Normalized Transient Impedance

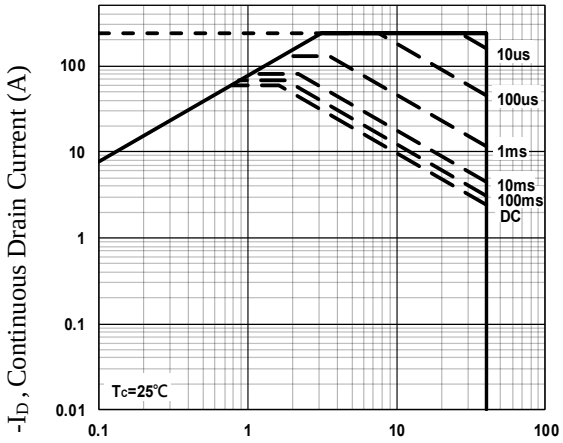


Fig.10 Maximum Safe Operation Area

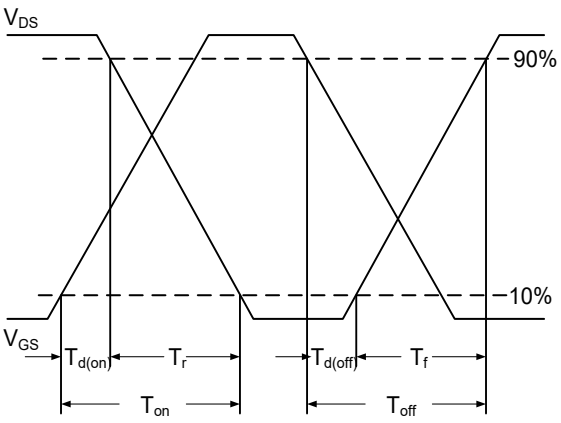


Fig.11 Switching Time Waveform

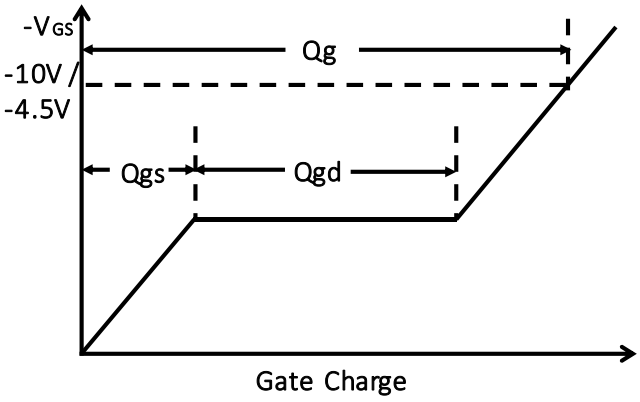
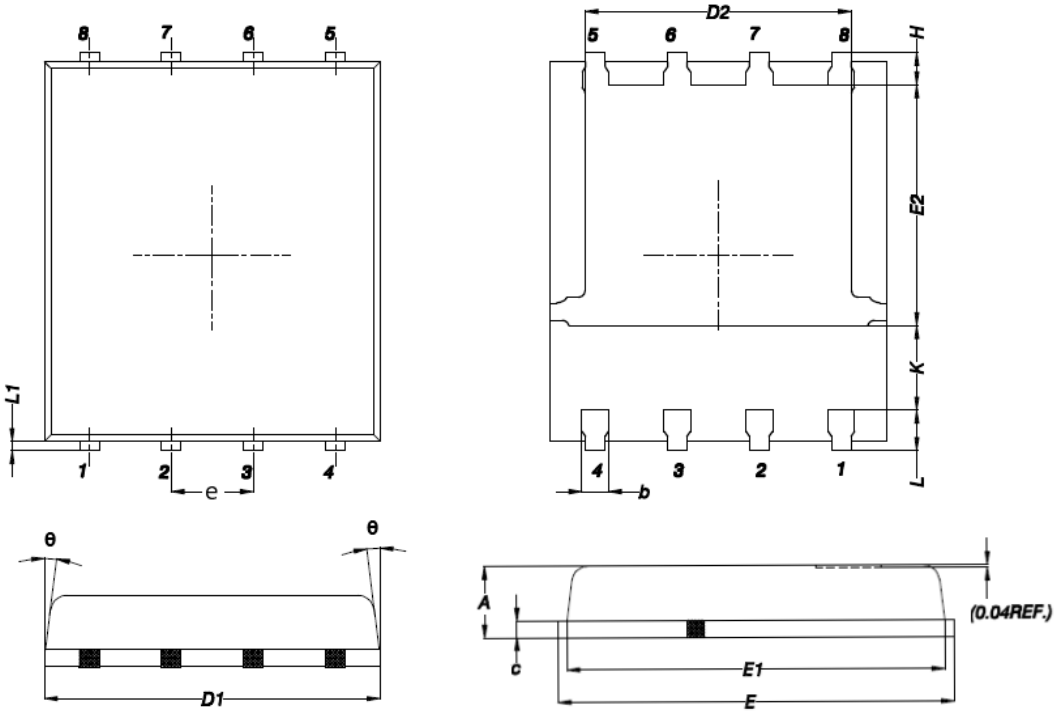


Fig.12 Gate Charge Waveform

PDFN5x6 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.200	0.850	0.047	0.031
b	0.510	0.300	0.020	0.012
C	0.300	0.200	0.012	0.008
D1	5.400	4.800	0.212	0.189
D2	4.310	3.610	0.170	0.142
E	6.300	5.850	0.248	0.230
E1	5.960	5.450	0.235	0.215
E2	3.920	3.300	0.154	0.130
e	1.27BSC		0.05BSC	
H	0.650	0.380	0.026	0.015
K	---	1.100	---	0.043
L	0.710	0.380	0.028	0.015
L1	0.250	0.050	0.009	0.002
θ	12°	0°	12°	0°