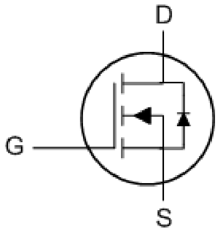
N-Ch 40V Fast Switching MOSFETs

Features:

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

TO220 Pin Configuration



Description:

The KEP4024A is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The KEP4024A meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Product Summary

BVDSS	RDSON	ID
40V	3.3mΩ	167A

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V^{1,6}	167	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V^{1,6}	105	A
I_{DM}	Pulsed Drain Current^2	360	A
EAS	Single Pulse Avalanche Energy^3	125	mJ
I_{AS}	Avalanche Current	50	A
P_D@T_C=25℃	Total Power Dissipation^4	149	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ^{1}	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case^1	---	0.84	℃/W

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=30A	---	2.6	3.3	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2	---	4.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=48V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=30A	---	53	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	0.8	---	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=32V , V_{GS}=10V , I_D=20A	---	65	---	nC
Q_{gs}	Gate-Source Charge		---	24	---	
Q_{gd}	Gate-Drain Charge		---	21	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=20V , V_{GS}=10V , R_G=3.3Ω, I_D=30A	---	26	---	ns
T_r	Rise Time		---	38	---	
$T_{d(off)}$	Turn-Off Delay Time		---	63	---	
T_f	Fall Time		---	20	---	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	4711	---	pF
C_{oss}	Output Capacitance		---	869	---	
C_{rss}	Reverse Transfer Capacitance		---	367	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	167	A
I_{SM}	Pulsed Source Current[2,5]		---	---	360	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V
t_{rr}	Reverse Recovery Time	I_F=30A , dI/dt=100A/µs , T_J=25℃	---	20.3	---	nS
Q_{rr}	Reverse Recovery Charge		---	9.5	---	nC

Note :
1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦2%
3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=50A
4.The power dissipation is limited by 150℃ junction temperature
5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.
6.Package limitation current is 85A.

Typical Characteristics

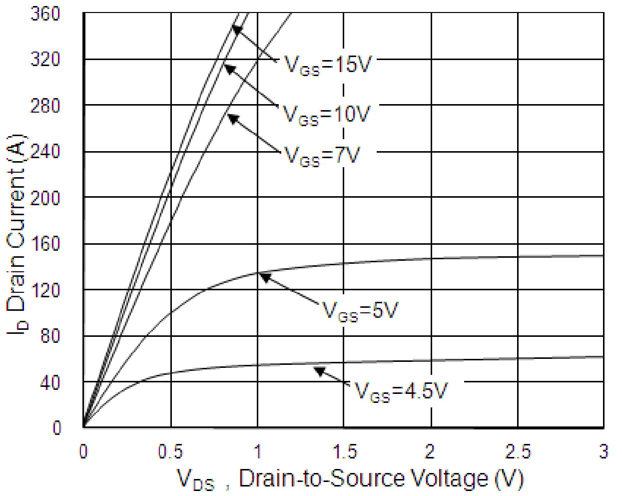


Fig.1 Typical Output Characteristics

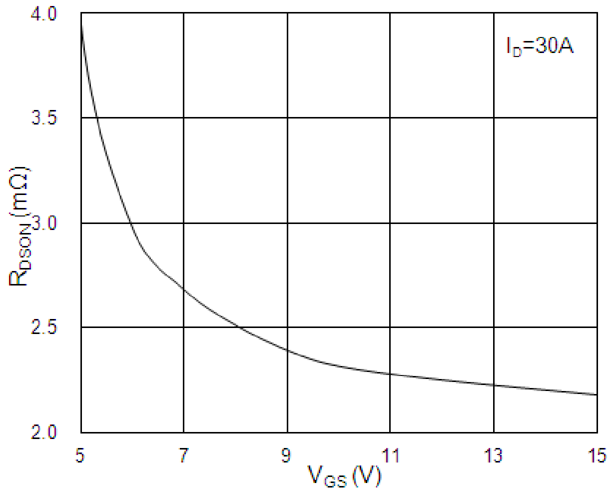


Fig.2 On-Resistance v.s Gate-Source

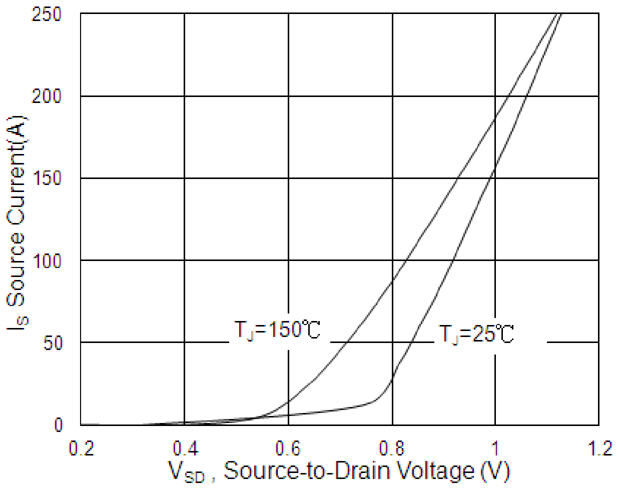


Fig.3 Forward Characteristics of Reverse

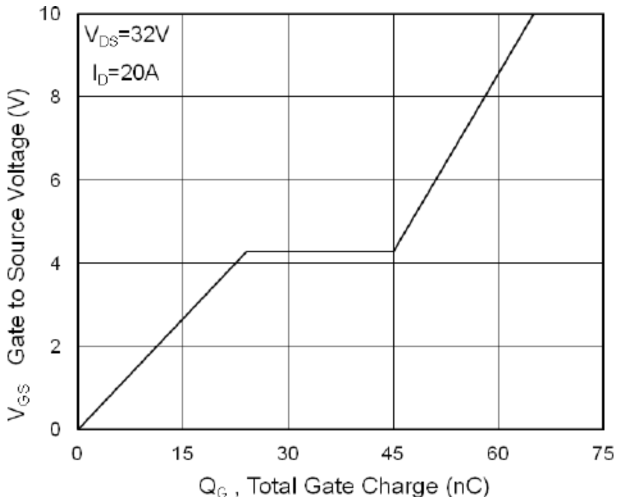


Fig.4 Gate-Charge Characteristics

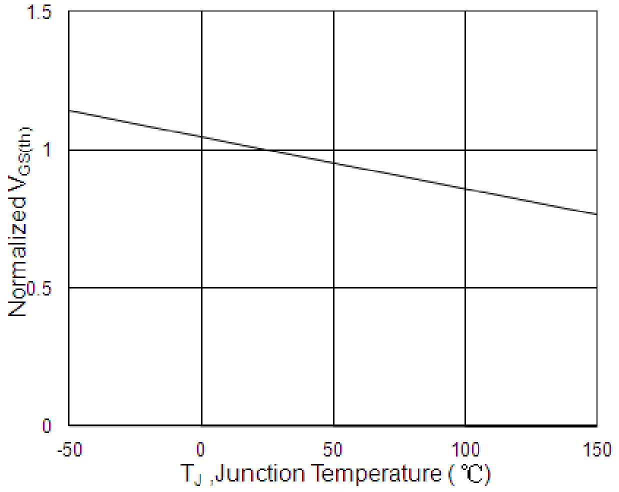


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

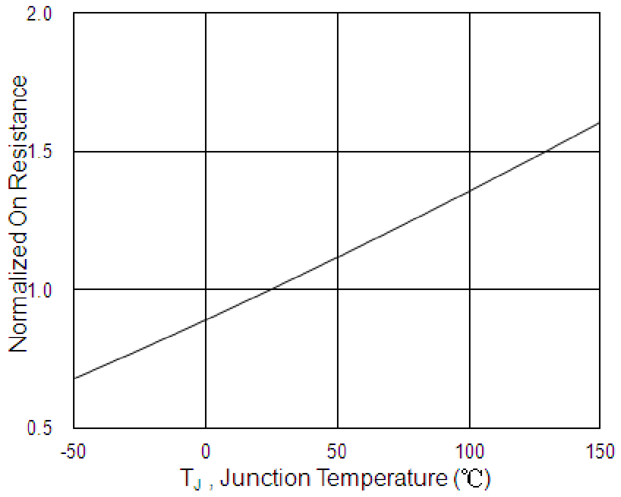


Fig.6 Normalized R_{DSON} vs. T_J

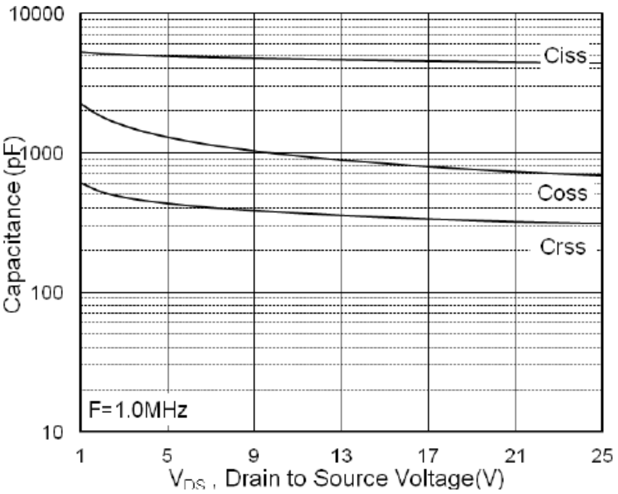


Fig.7 Capacitance

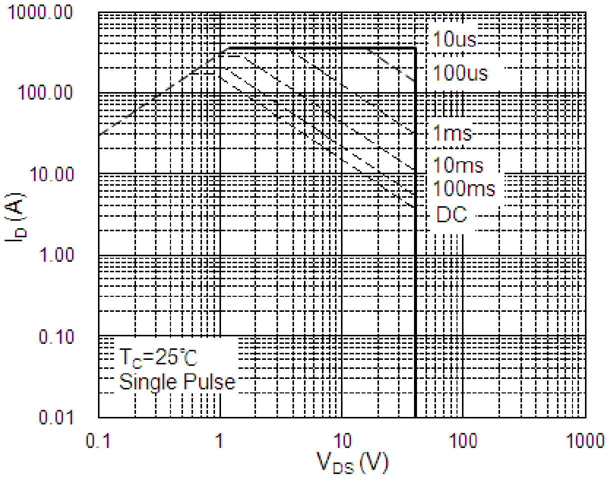


Fig.8 Safe Operating Area

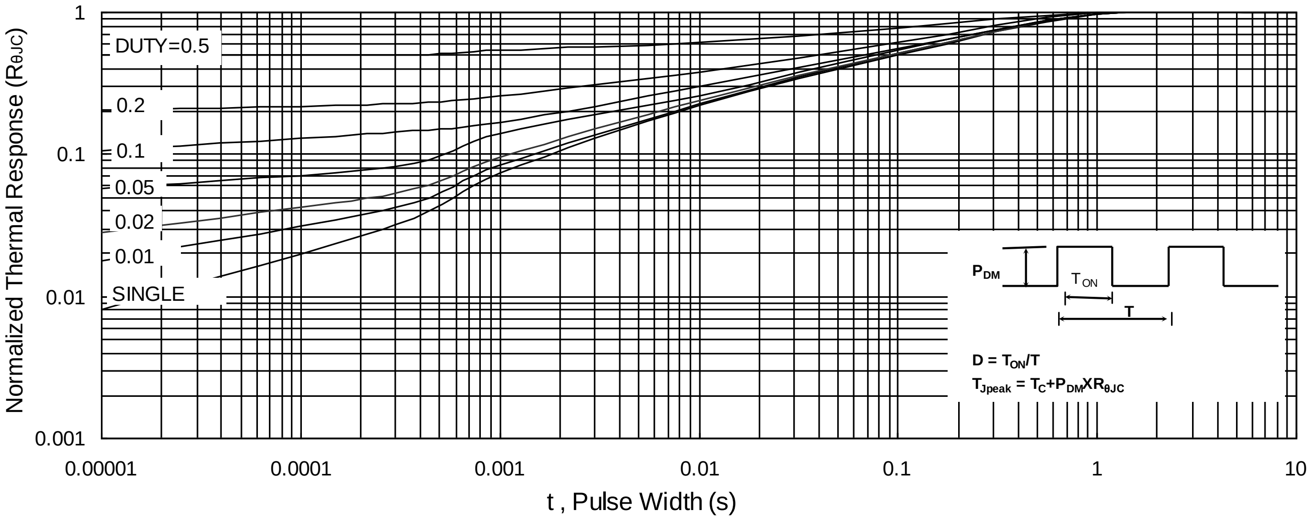


Fig.9 Normalized Maximum Transient Thermal Impedance

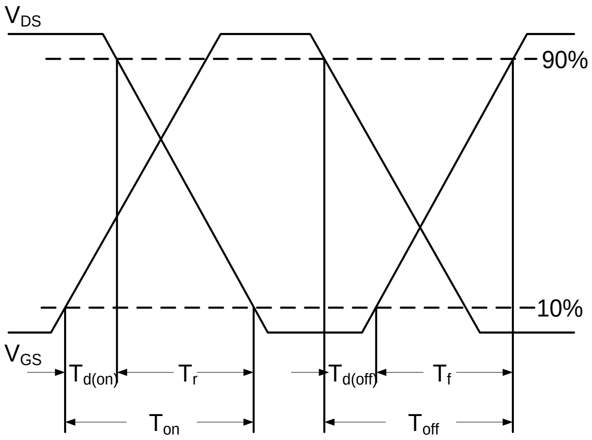


Fig.10 Switching Time Waveform

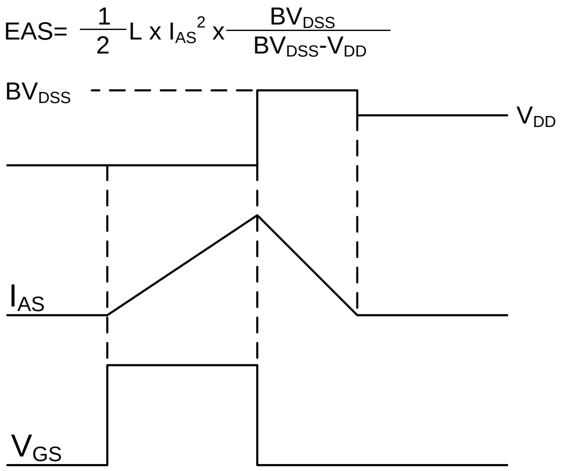
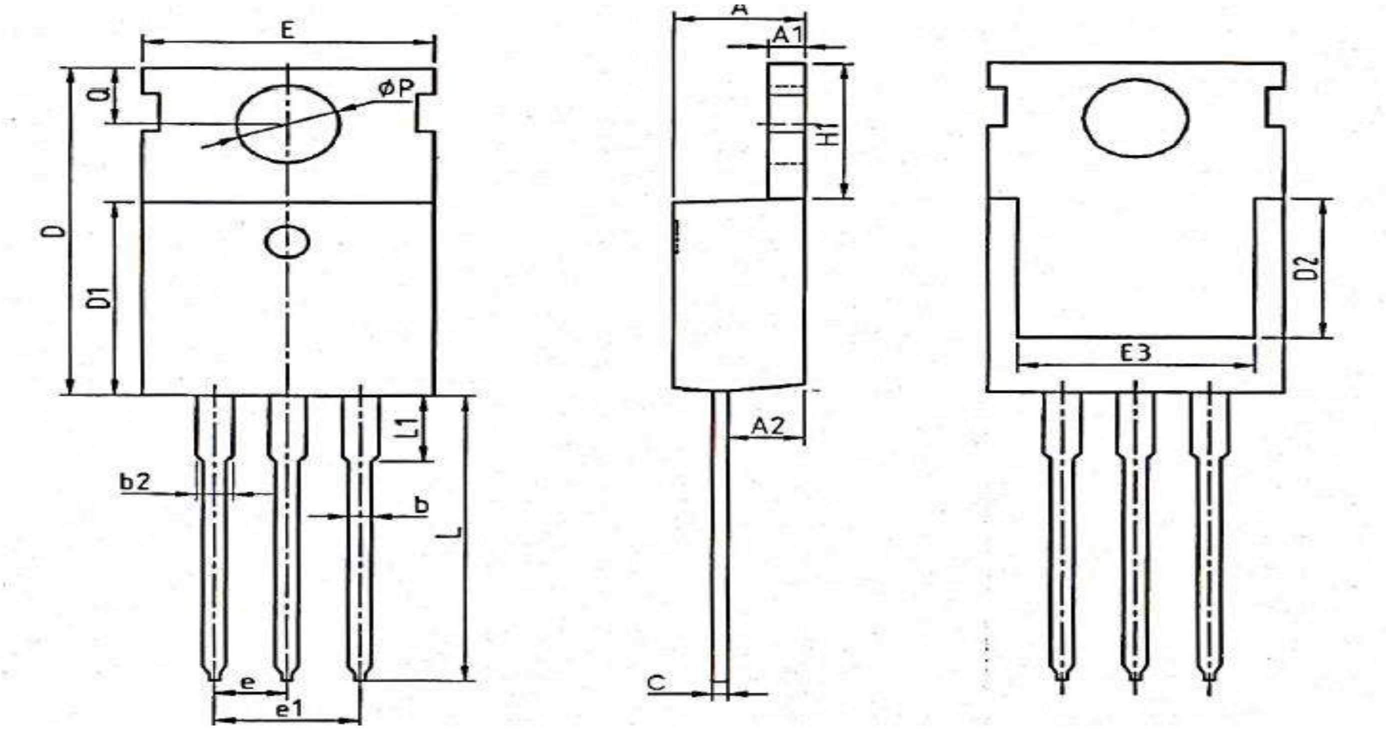


Fig.11 Unclamped Inductive Switching Waveform

TO-220_3L Package Outline



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	3.556	4.826	0.14	0.19
A1	0.508	1.4	0.02	0.055
A2	2.032	2.921	0.08	0.115
b	0.381	1.016	0.015	0.04
b2	1.143	1.778	0.045	0.07
c	0.356	0.61	0.014	0.024
D	14.224	16.51	0.56	0.65
D1	8.382	9.017	0.33	0.355
D2	5.5	-	0.216	-
E	9.652	10.668	0.38	0.42
E3	6.858	-	0.27	-
e	2.540 BSC		0.100 BSC	
e1	5.080BSC		0.200 BSC	
H1	5.842	6.858	0.23	0.27
L	12.7	14.732	0.5	0.58
L1	-	4.06	-	0.16
Q	2.54	3.048	0.1	0.12