



# 40V Dual N-Channel MOSFETs

## General Description

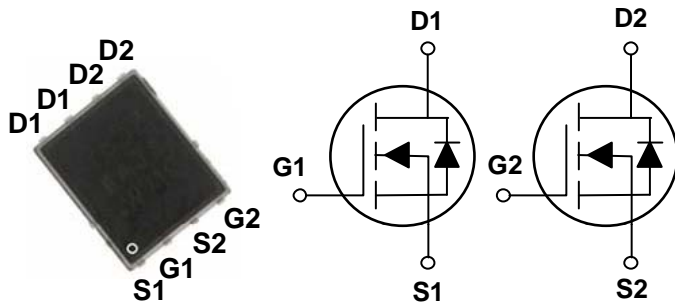
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

<b>BV<sub>DSS</sub></b>	<b>R<sub>DS(ON)</sub></b>	<b>I<sub>D</sub></b>
40 V	9 mΩ	30 A

## Features

- 40V, 30A, R<sub>DS(ON)</sub>=9mΩ @V<sub>GS</sub>=10V
- Fast switching
- Improved dv/dt capability
- Green Device Available

PPAK5X6 Pin Configuration



## Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2<sup>nd</sup> SR
- USB Type C

## Absolute Maximum Ratings T<sub>c</sub>=25°C unless otherwise noted

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	40	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current - Continuous (T <sub>c</sub> =25°C)	30	A
	Drain Current - Continuous (T <sub>c</sub> =100°C)	19	A
I <sub>DM</sub>	Drain Current - Pulsed (NOTE 1)	120	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	64	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	36	A
P <sub>D</sub>	Power Dissipation (T <sub>c</sub> =25°C)	46	W
	Power Dissipation - Derate above 25°C	0.37	W/°C
T <sub>J</sub>	Operating Junction Temperature Range	-50 to 150	°C
T <sub>STG</sub>	Storage Temperature Range	-50 to 150	°C
Marking Code		DC4806T, ND9P0	

## Thermal Characteristics

Symbol	Parameter	Typ.	Max	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to Ambient	---	62	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction to Case	---	2.7	°C/W



## 40V Dual N-Channel MOSFETs

Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

## Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=32V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

## On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance (NOTE 3)	$V_{GS}=10V, I_D=8A$	---	7.2	9	m $\Omega$
		$V_{GS}=4.5V, I_D=4A$	---	9.5	12	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1	1.6	2.5	V
gfs	Forward Transconductance	$V_{DS}=10V, I_D=10A$	---	13	---	S

## Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$Q_g$	Total Gate Charge (NOTE 3 & 4)	$V_{DS}=20V, V_{GS}=4.5V, I_D=8A$	---	12.2	24	nC
$Q_{gs}$	Gate-Source Charge (NOTE 3 & 4)		---	3.3	7	
$Q_{gd}$	Gate-Drain Charge (NOTE 3 & 4)		---	6.7	13	
$T_{d(on)}$	Turn-On Delay Time (NOTE 3 & 4)	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=1A$	---	13.2	25	ns
$T_r$	Rise Time (NOTE 3 & 4)		---	2.2	5	
$T_{d(off)}$	Turn-Off Delay Time (NOTE 3 & 4)		---	72	130	
$T_f$	Fall Time (NOTE 3 & 4)		---	4.5	10	
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	---	1220	2200	pF
$C_{oss}$	Output Capacitance		---	130	250	
$C_{rss}$	Reverse Transfer Capacitance		---	55	110	
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2.2	---	$\Omega$

## Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	$V_{DD}=25V, L=0.1\text{mH}, I_{AS}=6A$	1.8	---	---	mJ

## Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	30	A
$I_{SM}$	Pulsed Source Current (NOTE 3)		---	---	60	A
$V_{SD}$	Diode Forward Voltage (NOTE 3)	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V

## NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=36A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$ .
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.



Characteristics Curves

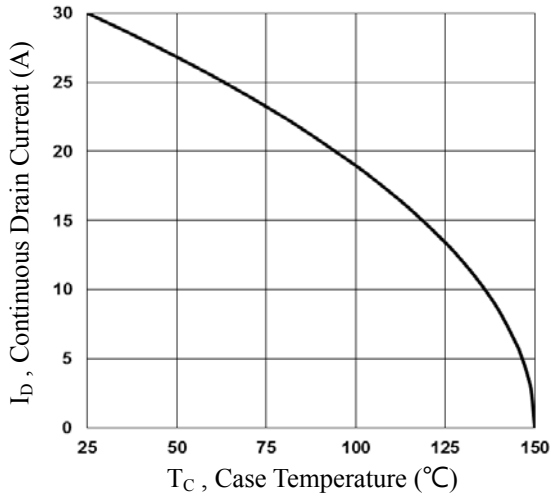


Fig.1 Continuous Drain Current vs.  $T_c$

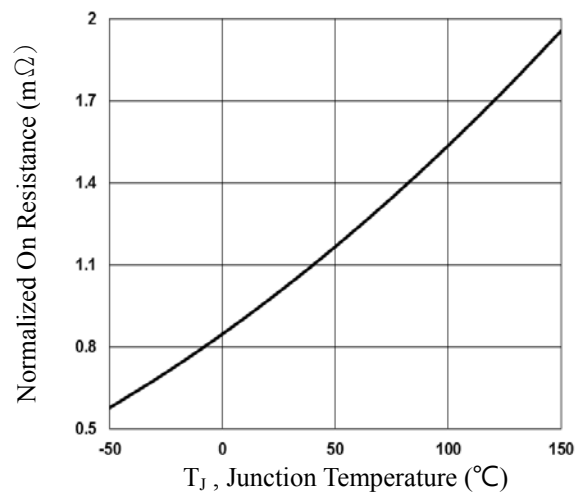


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

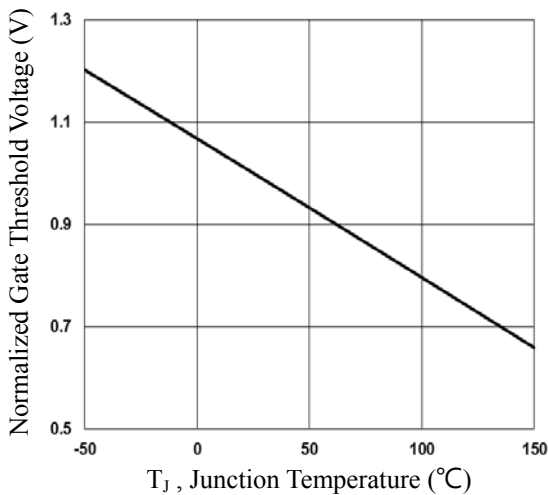


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

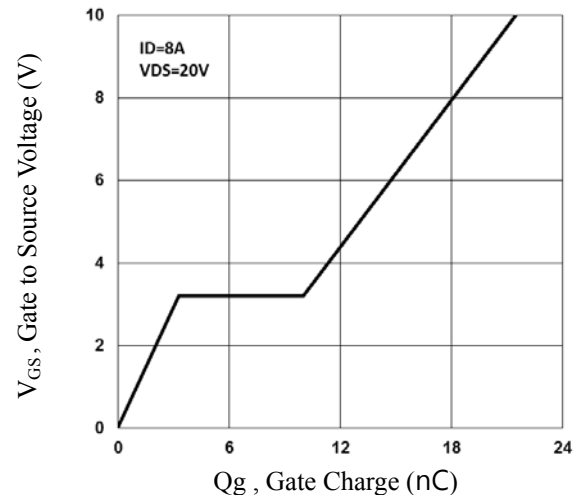


Fig.4 Gate Charge Waveform

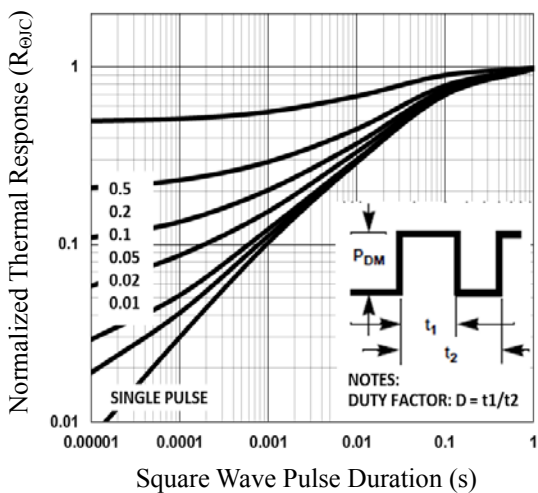


Fig.5 Normalized Transient Impedance

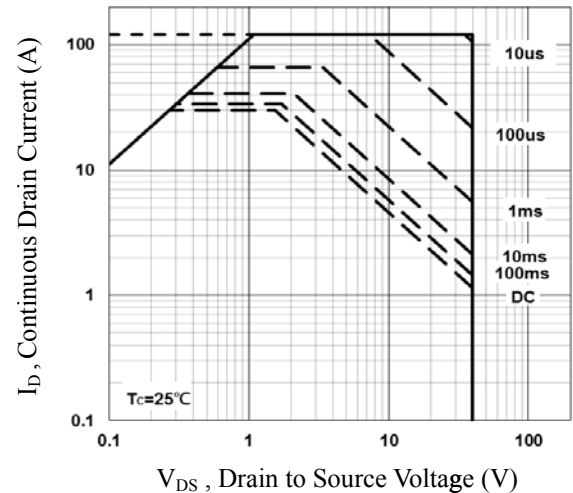


Fig.6 Maximum Safe Operation Area



Characteristics Curves

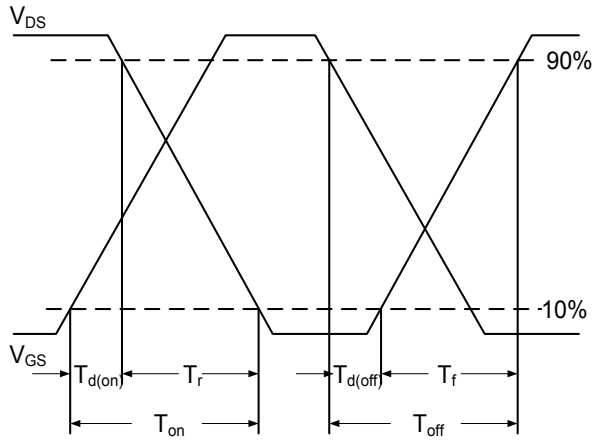


Fig.7 Switching Time Waveform

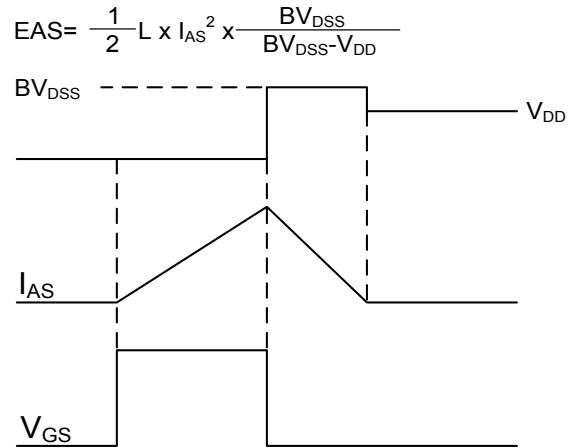
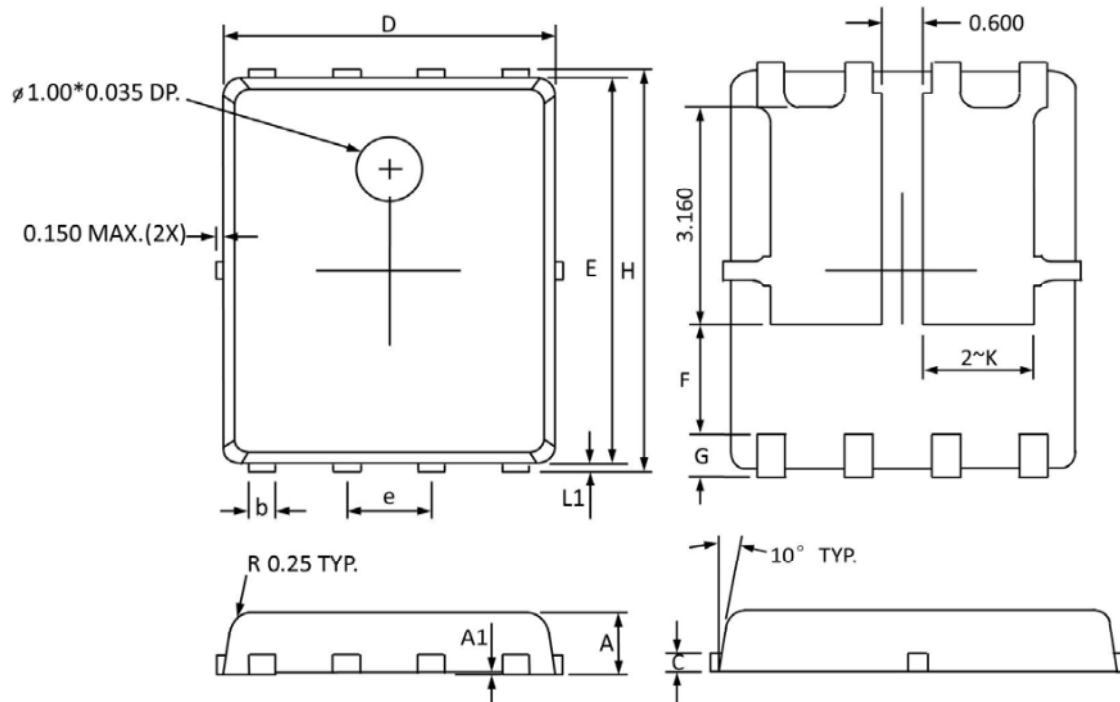


Fig.8 EAS Waveform



Package Outline Dimensions

PPAK5X6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.000	0.032	0.039
A1	0.000	0.005	0.000	0.000
b	0.350	0.490	0.014	0.019
C	0.254 Ref		0.254 Ref	
D	4.900	5.100	0.193	0.200
E	5.700	5.900	0.225	0.232
e	1.27 BSC		1.27 BSC	
F	1.600 Ref		1.600 Ref	
G	0.600 Ref		0.600 Ref	
H	5.950	6.200	0.235	0.244
L1	0.100	0.180	0.004	0.007
K	1.600 Ref		1.600 Ref	



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