

### General Description

This PAN40S48Y N-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent  $R_{ds}(On)$  performance and efficiency for power switching and load switching application., this device also comply with the RoHS and Green Product requirement with full function reliability approved.

BVDSS	RDSON	ID
40V	1.8mΩ	100A

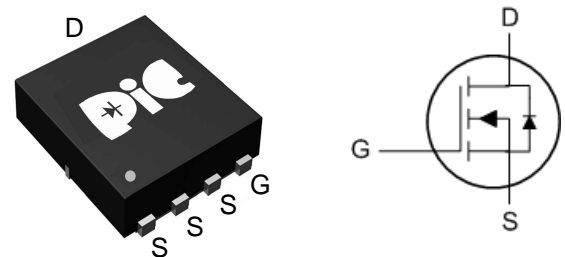
### Feature

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

### Application

- ▼ DC/DC Primary Side Switch
- ▼ Industrial Synchronous
- ▼ Rectification Load Switch
- ▼ DC/DC Converters

### DNF5X6A-EP1 Pin Configuration



### Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current, $V_{GS} @ 10V_{1,6}$	$I_D @ T_C=25^\circ C$	100	A
Continuous Drain Current, $V_{GS} @ 10V_{1,6}$	$I_D @ T_C=100^\circ C$	82	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	400	A
Single Pulse Avalanche Energy <sup>3</sup>	EAS	400	mJ
Avalanche Current	$I_{AS}$	40	A
Total Power Dissipation <sup>4</sup>	$P_D @ T_C=25^\circ C$	125	W
Storage Temperature Range	$T_{STG}$	-55 to 150	$^\circ C$
Operating Junction Temperature Range	$T_J$	-55 to 150	$^\circ C$
Thermal Resistance Junction-Ambient <sup>1</sup>	$R_{\theta JA}$	50	$^\circ C/W$
Thermal Resistance Junction-Case <sup>1</sup>	$R_{\theta JC}$	1	$^\circ C/W$

### Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	40	---	---	V
Static Drain-Source OnResistance <sup>2</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V , I <sub>D</sub> =20A	---	1.5	1.8	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =20A	---	2.0	2.6	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	1.6	2.2	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =32V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =32V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C	---	---	5	
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V	---	---	±100	nA
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =5V , I <sub>D</sub> =20A	---	53	---	S
Gate Resistance	R <sub>g</sub>	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	1.0	---	Ω
Total Gate Charge (4.5V)	Q <sub>g</sub>	V <sub>DS</sub> =15V , V <sub>GS</sub> =10V , I <sub>D</sub> =20A	---	45	---	nC
Gate-Source Charge	Q <sub>gs</sub>		---	12	---	
Gate-Drain Charge	Q <sub>gd</sub>		---	18.5	---	
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>DD</sub> =15V , V <sub>GS</sub> =10V , R <sub>G</sub> =3.3Ω, I <sub>D</sub> =20A	---	18.5	---	ns
Rise Time	T <sub>r</sub>		---	9	---	
Turn-Off Delay Time	T <sub>d(off)</sub>		---	58.5	---	
Fall Time	T <sub>f</sub>		---	32	---	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =20V , V <sub>GS</sub> =0V , f=1MHz	---	3972	---	pF
Output Capacitance	C <sub>oss</sub>		---	1119	---	
Reverse Transfer Capacitance	C <sub>rss</sub>		---	82	---	

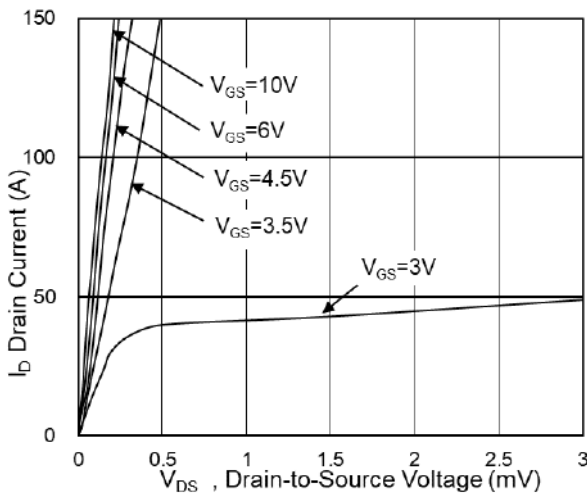
### Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current <sup>1,6</sup>	I <sub>S</sub>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	100	A
Diode Forward Voltage <sup>2</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C	---	---	1.2	V

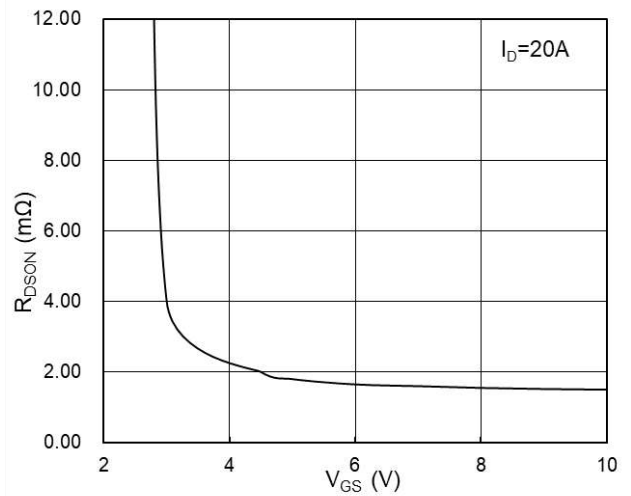
Note :

- Pulse width limited by maximum junction temperature.
- The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.5mH, I<sub>AS</sub>=40A
- Ensure that the channel temperature does not exceed 150°C.
- The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.
- Package limitation current is 100A.

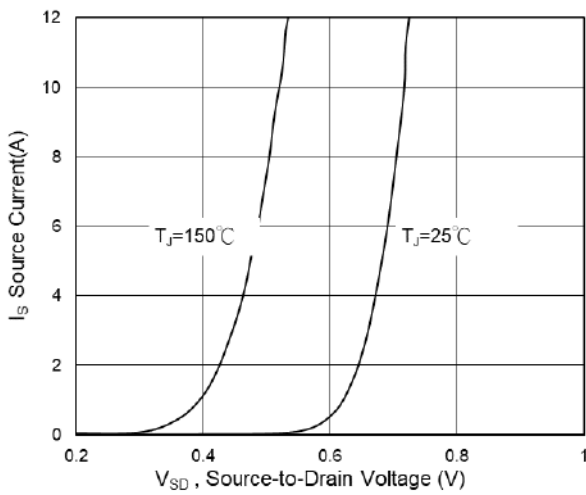
### Typical Characteristics



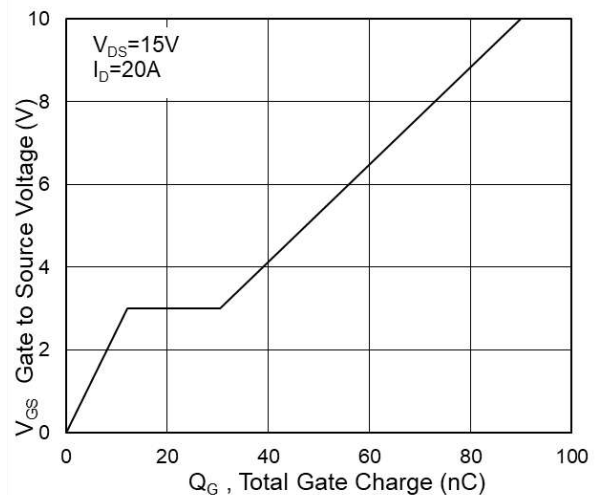
**Fig.1 Typical Output Characteristics**



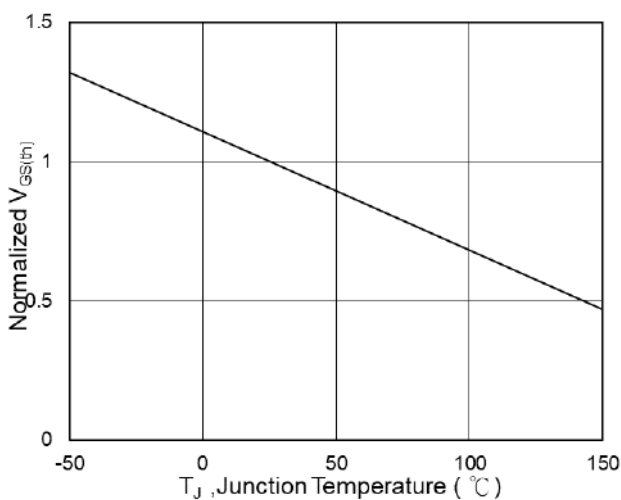
**Fig.2 On-Resistance vs G-S Voltage**



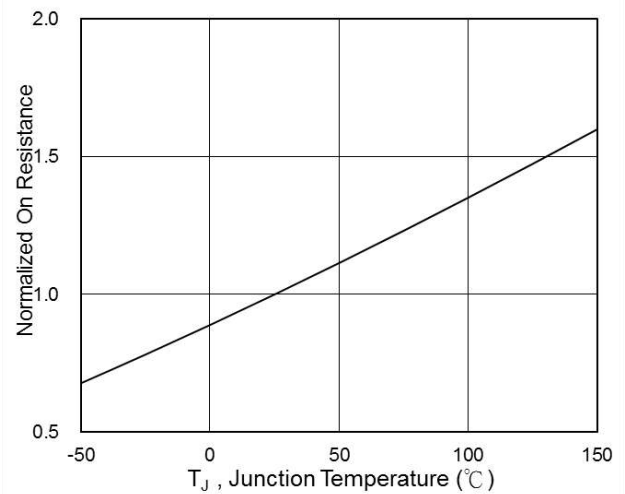
**Fig.3 Source Drain Forward Characteristics**



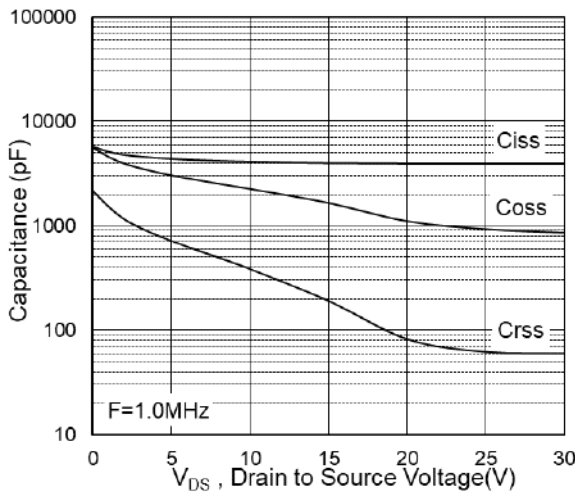
**Fig.4 Gate-Charge Characteristics**



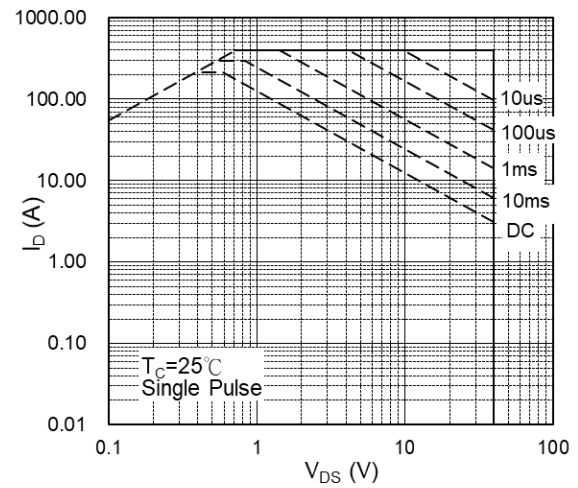
**Fig.5 Normalized V<sub>GS(th)</sub> vs T<sub>J</sub>**



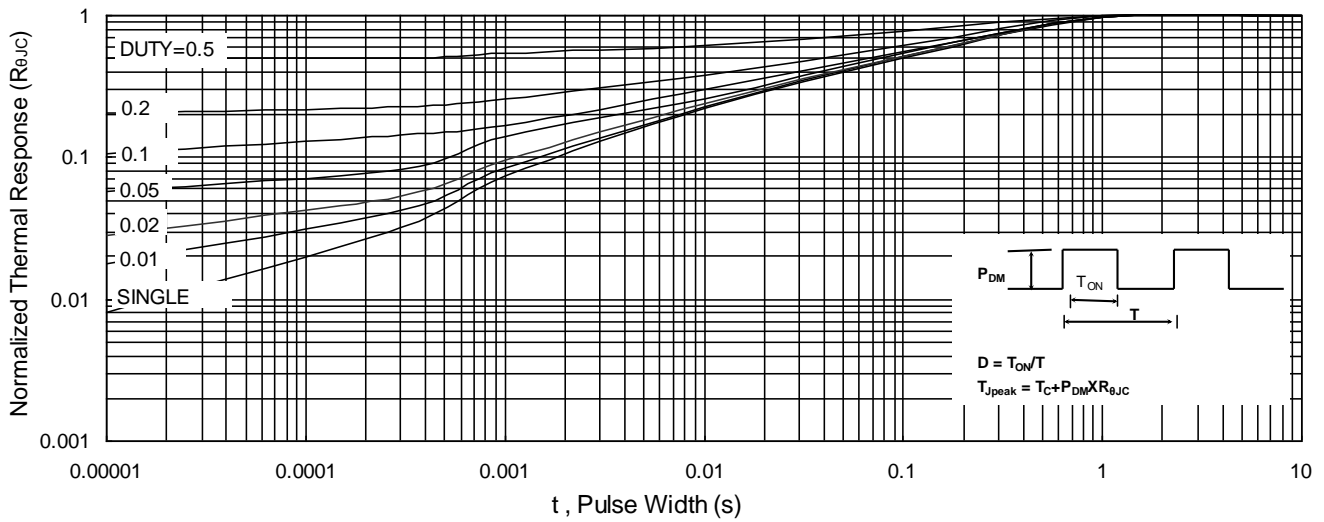
**Fig.6 Normalized R<sub>DS(on)</sub> vs T<sub>J</sub>**



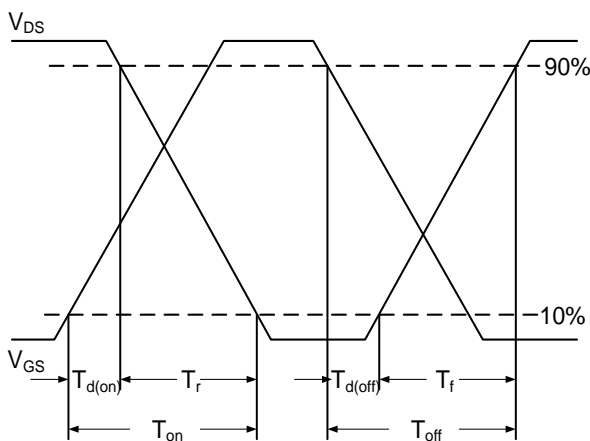
**Fig.7 Capacitance**



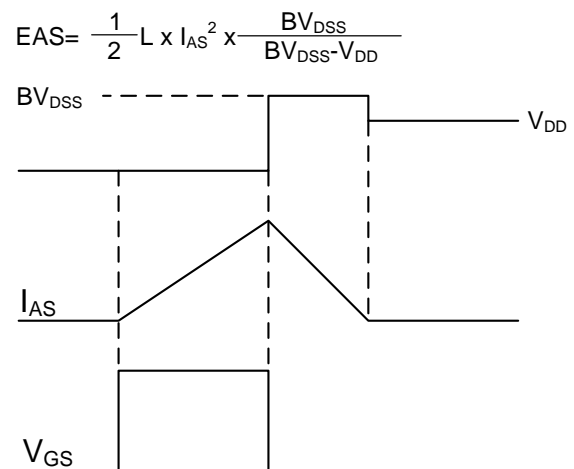
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**

### Recommand IR Reflow Soldering Thermal Profile

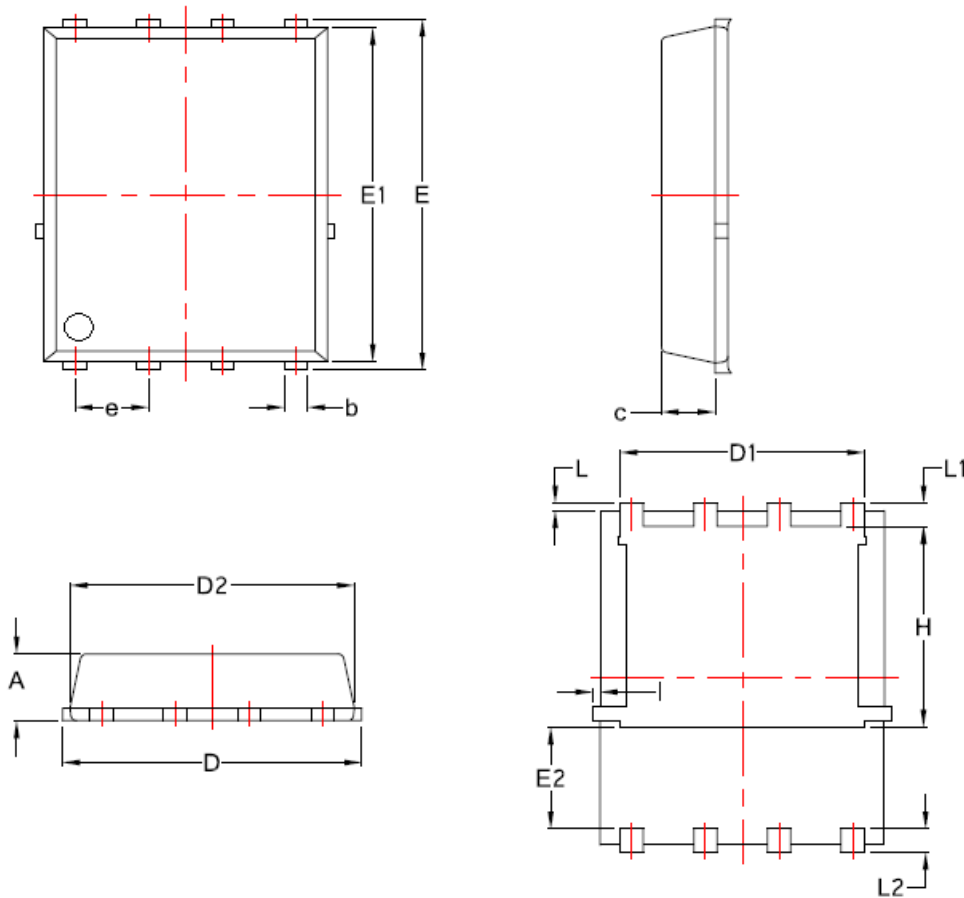


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds
Average Ramp-up Rate (tL to tP)	3°C/second max.
Liquidous Temperature (TL)	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (tP) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

### Ordering Information

Part Number	Description	Quantity
PAN40S48Y	DFN5X6A-EP1 Reel	3000 pcs

### Package Information (DFN5X6A-EP1)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.970	0.0324	0.0382
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
I	---	0.18	---	0.0070
E	5.90	6.15	0.2323	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.10	---	0.0433	---
e	1.27 BSC		0.05 BSC	
H	3.30	3.78	0.1299	0.1488
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.61	0.0150	0.0240
L2	0.38	0.71	0.0150	0.0279

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