

# AD30N54D3

Nch 30V 54A Power MOSFET

Datasheet

$V_{DSS}$	30V
$R_{DS(on)}$ (typ.)	5.7m $\Omega$
$I_D$	54A
$P_D$	34.7W

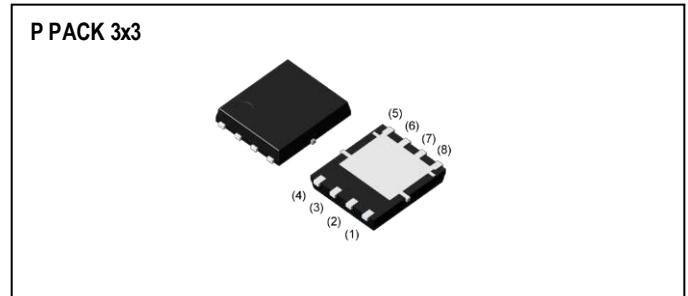
## Features

- 1) Low on - resistance
- 2) High power package (P PAK3X3)
- 3) Pb-free lead plating ; RoHS compliant
- 4) Halogen free
- 5) 100% Rg and UIS tested

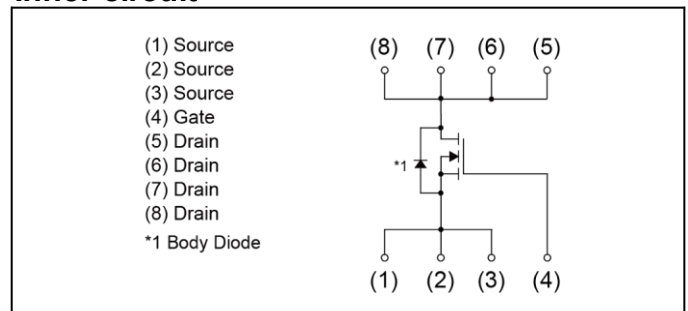
## Application

Switching

## Outline



## Inner circuit



## Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	330
	Tape width (mm)	12
	Basic ordering unit (pcs)	5000
	Taping code	D3
	Marking	AD30N54D3

## Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ )

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current – Continuous ( $T_c=25^\circ\text{C}$ )	54	A
	Drain Current – Continuous ( $T_c=100^\circ\text{C}$ )	34	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	216	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	45	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	30	A
$P_D$	Power Dissipation ( $T_c=25^\circ\text{C}$ )	34.7	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.28	W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	3.6	$^\circ\text{C}/\text{W}$

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

#### Static State Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.04	---	V/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>3</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =16A	---	5.7	7.2	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	---	8.4	11.5	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	1.6	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-4	---	mV/°C
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =3A	---	15	---	S

#### Dynamic Characteristics

Q <sub>g</sub>	Total Gate Charge <sup>3,4</sup>	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	11.4	22	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>3,4</sup>		---	2.1	4	
Q <sub>gd</sub>	Gate-Drain Charge <sup>3,4</sup>		---	2.5	5	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>3,4</sup>	V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω I <sub>D</sub> =15A	---	4.8	9	ns
T <sub>r</sub>	Rise Time <sup>3,4</sup>		---	12.5	24	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>3,4</sup>		---	27.6	52	
T <sub>f</sub>	Fall Time <sup>3,4</sup>		---	8.2	16	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz	---	680	1400	pF
C <sub>oss</sub>	Output Capacitance		---	133	260	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	78	160	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	2.4	---	Ω

#### Guaranteed Avalanche Energy

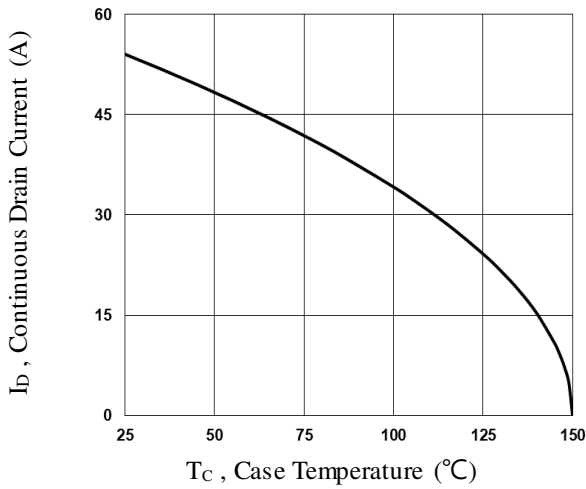
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =15A	12	---	---	mJ

#### Drain-Source Diode Characteristics

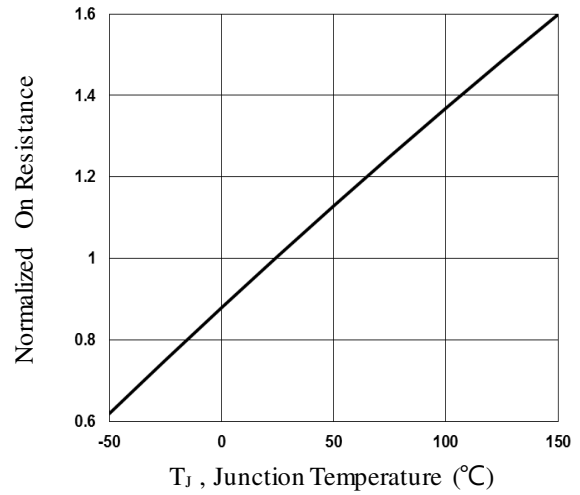
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	54	A
I <sub>SM</sub>	Pulsed Source Current <sup>3</sup>		---	---	108	A
V <sub>SD</sub>	Diode Forward Voltage <sup>3</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =10A, di/dt=100A/μs	---	126	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge	T <sub>J</sub> =25°C	---	165	---	nC

Note :

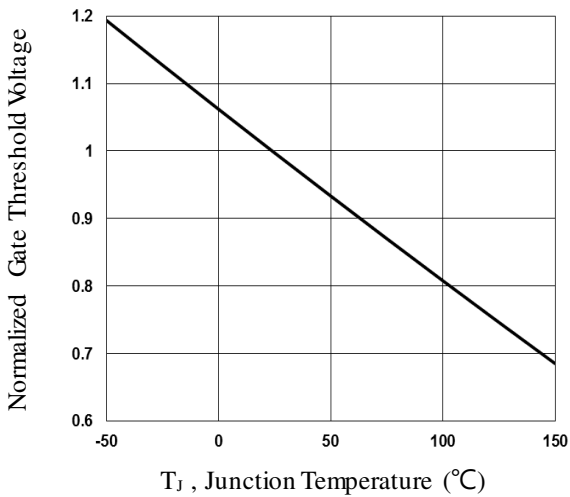
- 1.Repetitive Rating : Pulsed width limited by maximum junction temperature.
- 2.V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=30A., R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
- 3.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
- 4.Essentially independent of operating temperature.



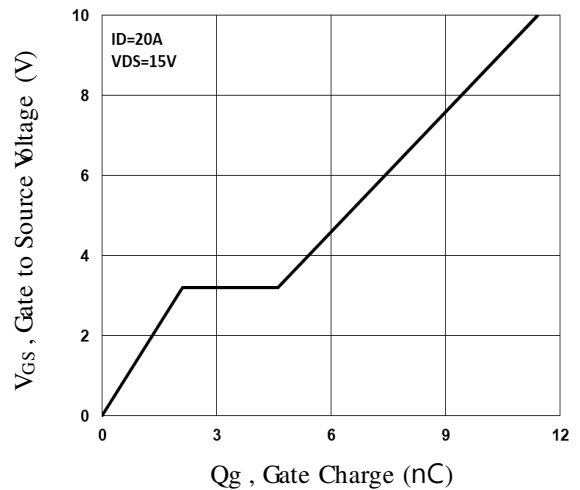
**Fig.1 Continuous Drain Current vs. T<sub>c</sub>**



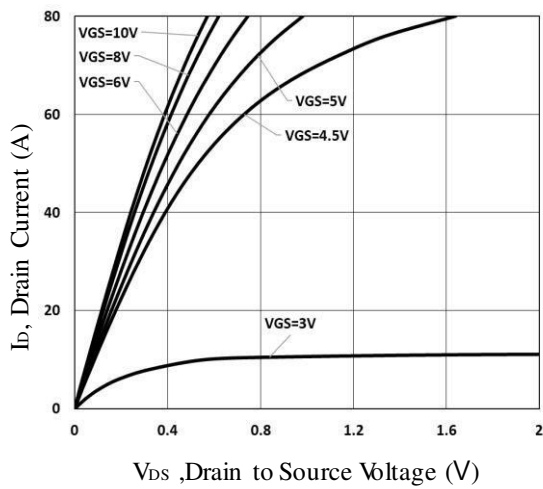
**Fig.2 Normalized R<sub>DS(on)</sub> vs. T<sub>j</sub>**



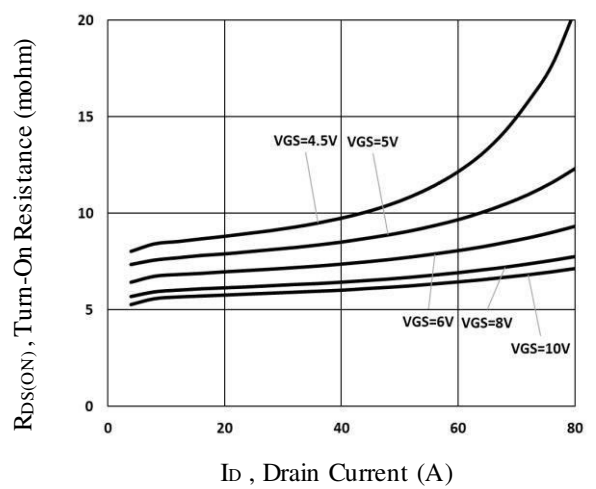
**Fig.3 Normalized V<sub>th</sub> vs. T<sub>j</sub>**



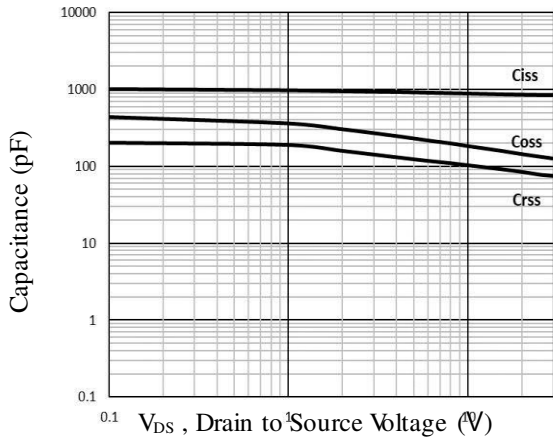
**Fig.4 Gate Charge Waveform**



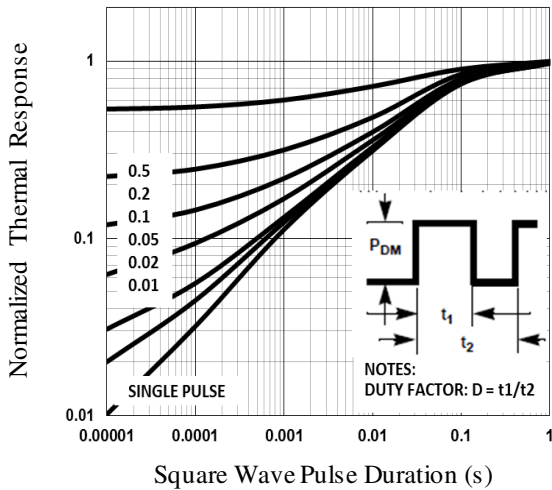
**Fig.5 Typical Output Characteristics**



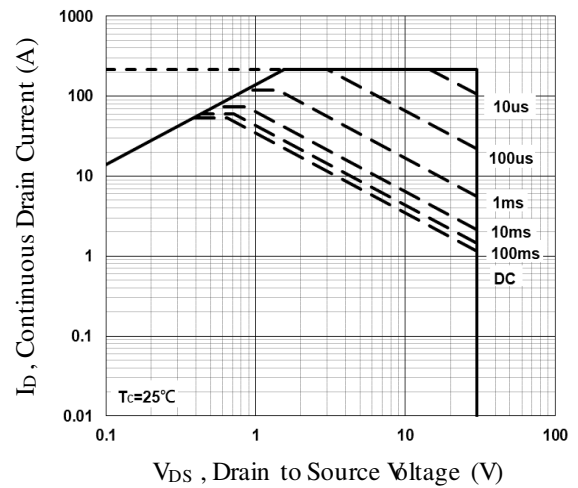
**Fig.6 Turn-On Resistance vs. I<sub>D</sub>**



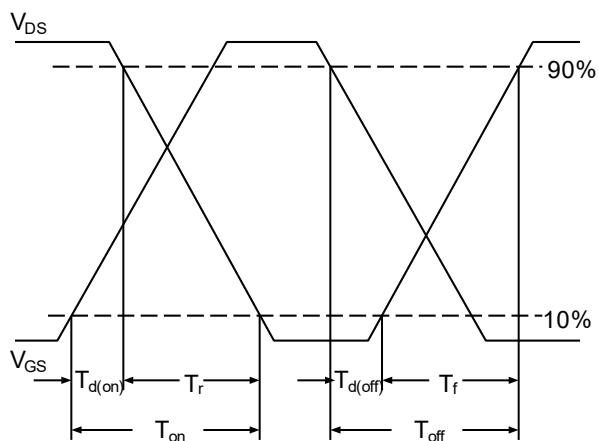
**Fig.7 Capacitance Characteristics**



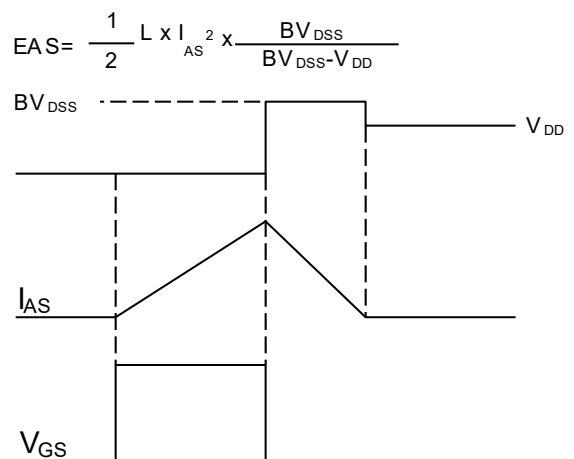
**Fig.8 Normalized Transient Impedance**



**Fig.9 Maximum Safe Operation Area**

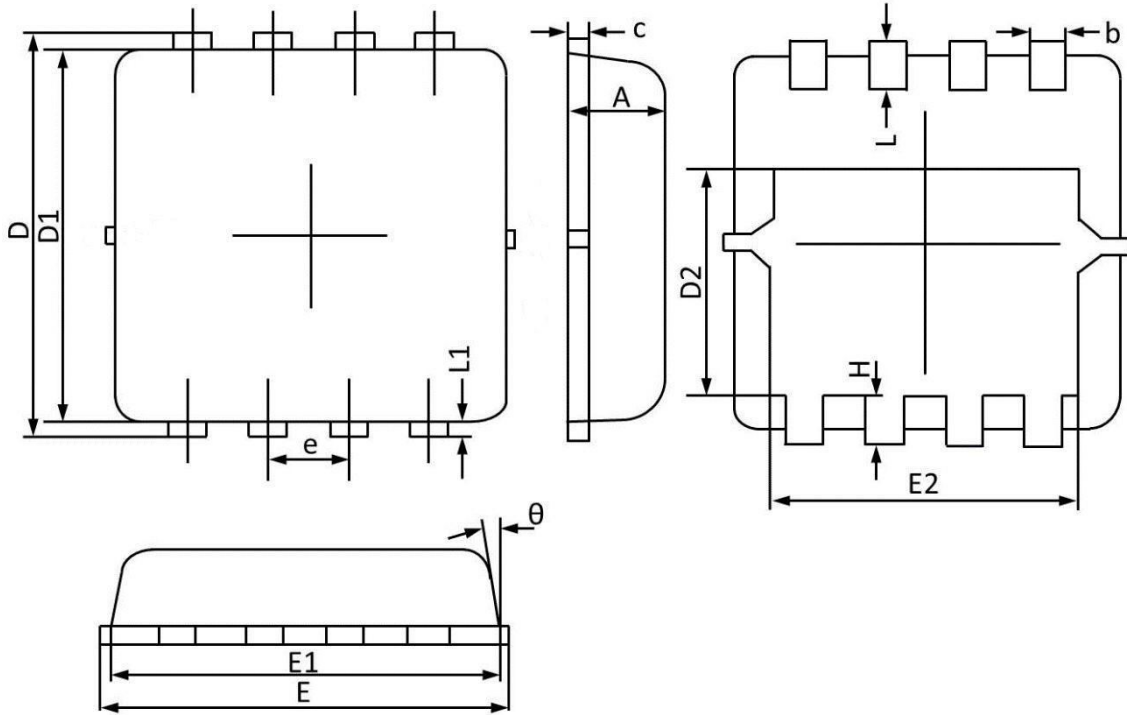


**Fig.10 Switching Time Waveform**



**Fig.11 EAS Waveform**

## PPAK3x3 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.900	0.700	0.035	0.028
b	0.350	0.250	0.014	0.010
c	0.250	0.100	0.010	0.004
D	3.500	3.050	0.138	0.120
D1	3.200	2.900	0.126	0.114
D2	1.950	1.350	0.077	0.053
E	3.400	3.000	0.134	0.118
E1	3.300	2.900	0.130	0.114
E2	2.600	2.350	0.102	0.093
e	0.65BSC		0.026BSC	
H	0.750	0.300	0.030	0.012
L	0.600	0.300	0.024	0.012
L1	0.200	0.060	0.008	0.002
θ	14°	6°	14°	6°