

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
-30V	13mΩ@-10V	-16A
	22mΩ@-4.5V	

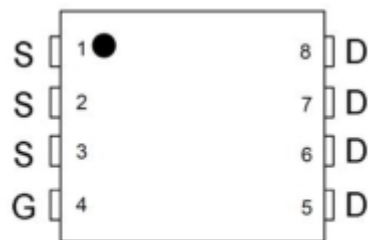
## Feature

- Enhancement mode
- Low on-resistance  $R_{DS(on)}$
- Pb-free lead plating; RoHS compliant

## Application

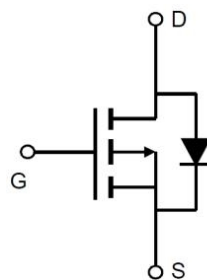
- Battery Switch
- Load switch
- Power management

## Package

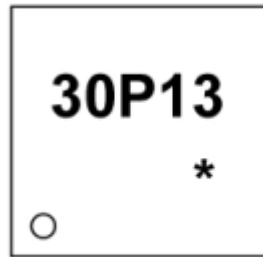


PDFNWB3.3×3.3-8L

## Circuit diagram



## Marking



30P13 =Device Code  
\* =Month Code

## Absolute maximum ratings

(T<sub>a</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	-30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current-Continuous	I <sub>D</sub>	-16	A
Pulsed Drain Current <sup>1)</sup>	I <sub>DM</sub>	-64	A
Maximum Power Dissipation	P <sub>D</sub>	33	W
Thermal Resistance from Junction to Ambient <sup>2)</sup>	R <sub>θJA</sub>	3.8	°C
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55~ +150	°C

## Electrical characteristics

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

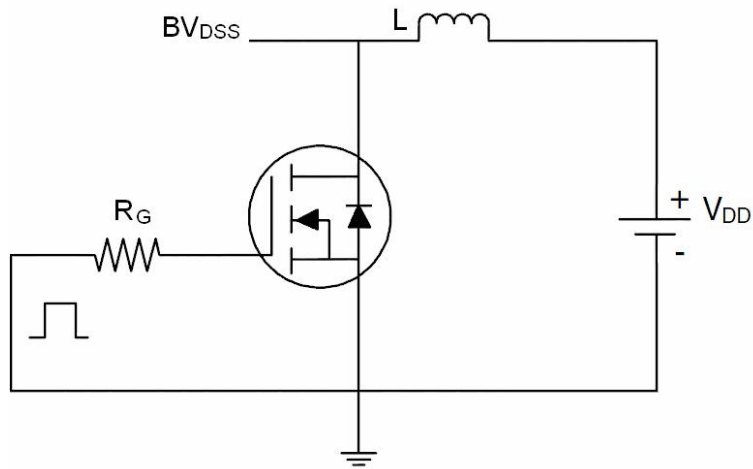
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV (BR)DSS	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-30			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V			-1	uA
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V			±100	uA
On Characteristics (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.2	-1.6	-2.5	V
Drain-Source On-Resistance <sup>1</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -20A		13	18	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -15A		22	30	
Forward Transconductance	g <sub>FS</sub>	V <sub>GS</sub> = -5V, I <sub>D</sub> = -20A		25		S
Dynamic Characteristics (Note 4)						
Input Capacitance	C <sub>iSS</sub>	V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V, f=1MHz		1363		pF
Output Capacitance	C <sub>oSS</sub>			250		
Reverse Transfer Capacitance	C <sub>rSS</sub>			210		
Switching Characteristics(Note 4)						
Turn-on Delay Time	T <sub>d(on)</sub>	V <sub>DD</sub> = -30V, R <sub>L</sub> =3Ω, V <sub>GS</sub> = -10V, R <sub>G</sub> =2.5Ω		9		nS
Turn-on Rise Time	T <sub>r</sub>			10		
Turn-off Delay Time	T <sub>d(off)</sub>			50		
Turn-off Fall Time	T <sub>f</sub>			20		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -15V , I <sub>D</sub> = -15A, V <sub>GS</sub> = -10V,		31.2		nC
Gate-Source Charge	Q <sub>gs</sub>			3.2		
Gate-Drain Charge	Q <sub>gd</sub>			9.2		
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	I <sub>S</sub> = -15A,V <sub>GS</sub> =0V			-1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = - 15A		24		nS
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = -100A/μs(Note3)		16		nC

### Note:

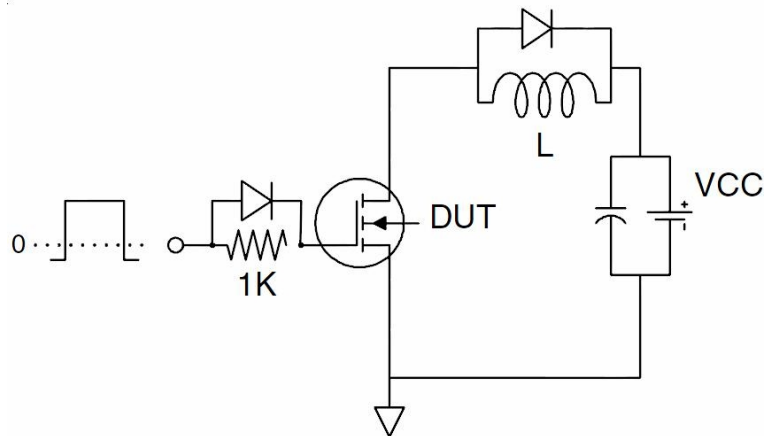
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_J = 25^{\circ}\text{C}, V_{DD} = 15V, V_G = 10V, L = 0.5mH, R_g = 25\Omega, I_{AS} = 26A$

## Test Circuits

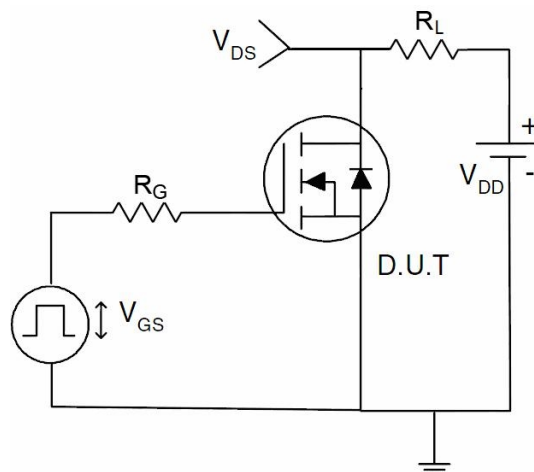
- EAS Test Circuits



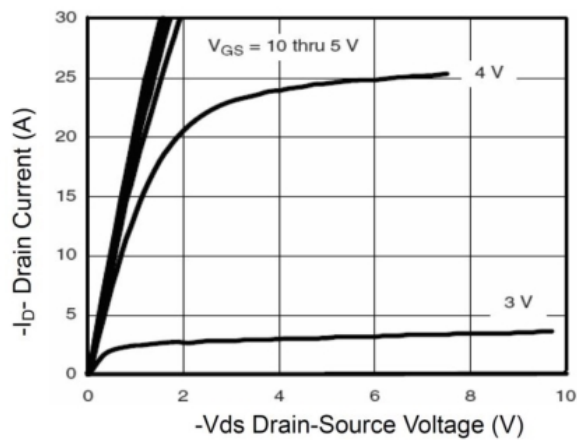
- Gate Charge Test Circuit



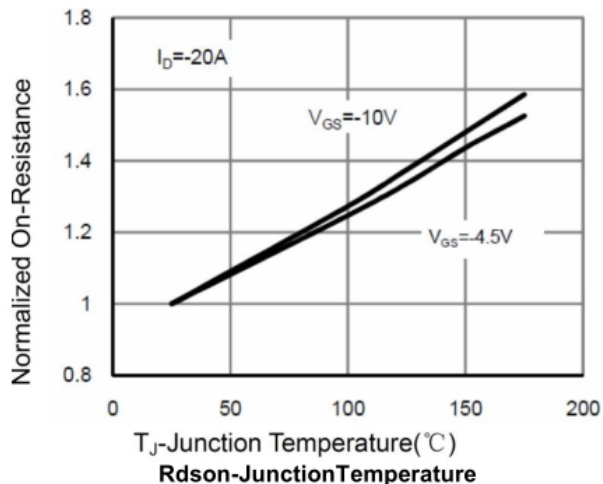
- Switch Time Test Circuit



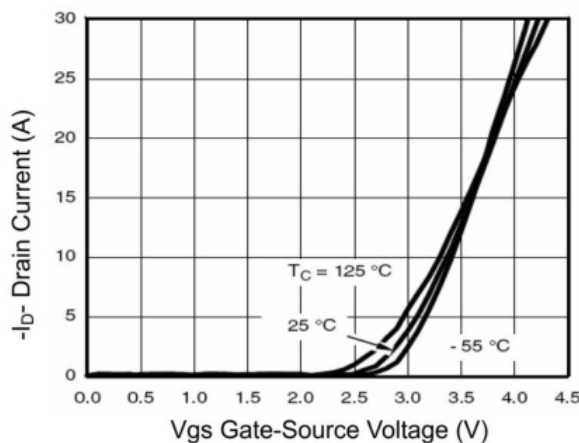
## Typical Characteristics



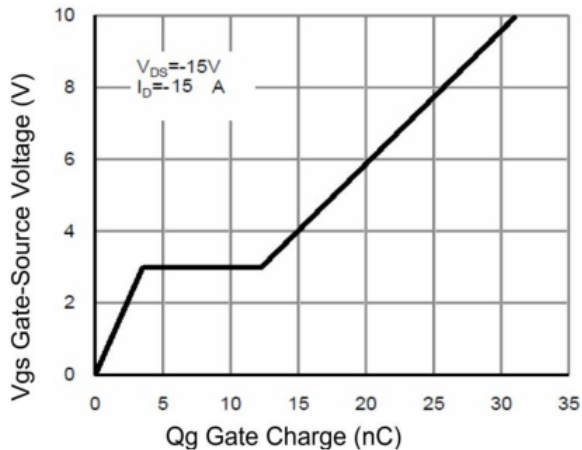
Output Characteristics



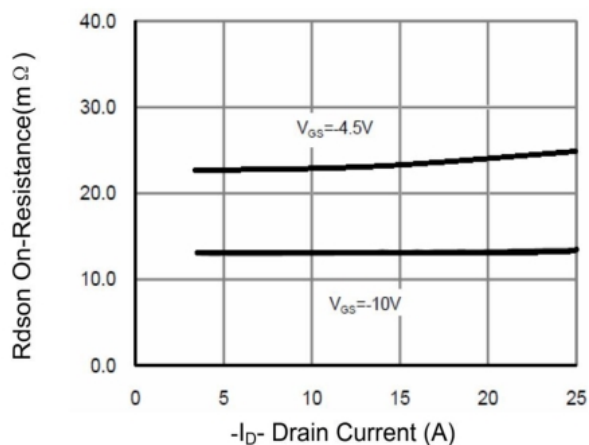
Rdson-Junction Temperature



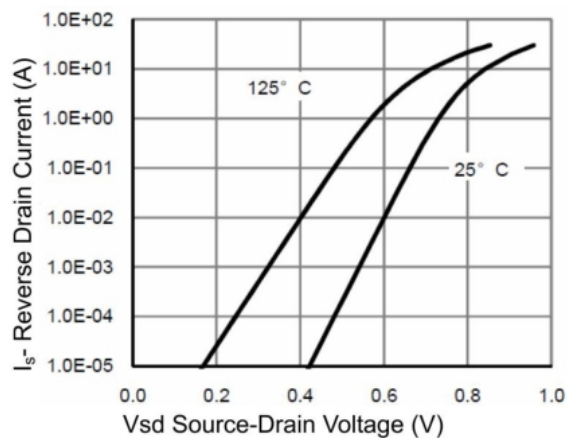
Transfer Characteristics



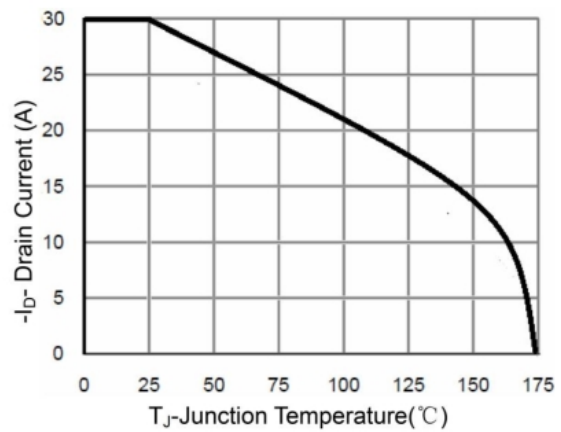
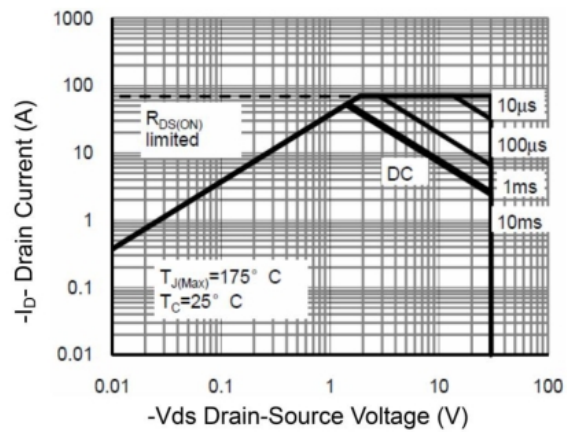
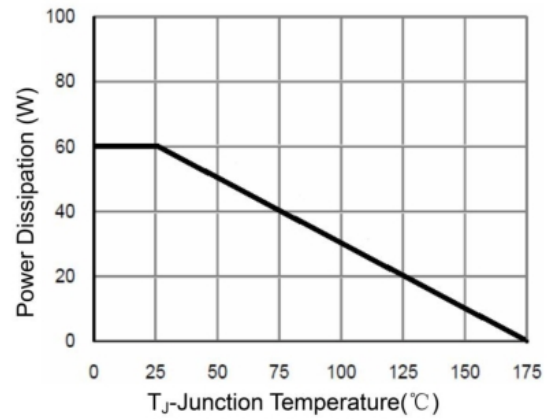
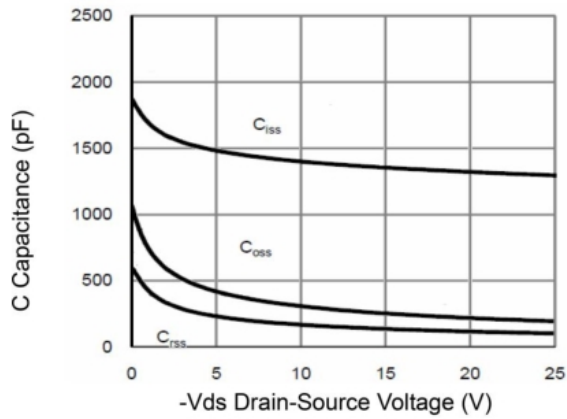
Gate Charge



Rdson- Drain Current

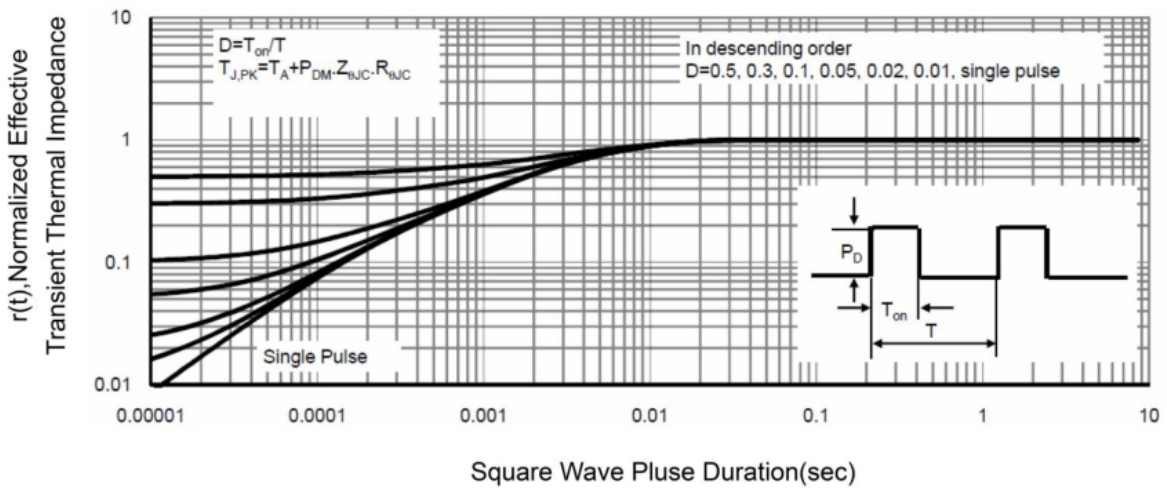


Source- Drain Diode Forward



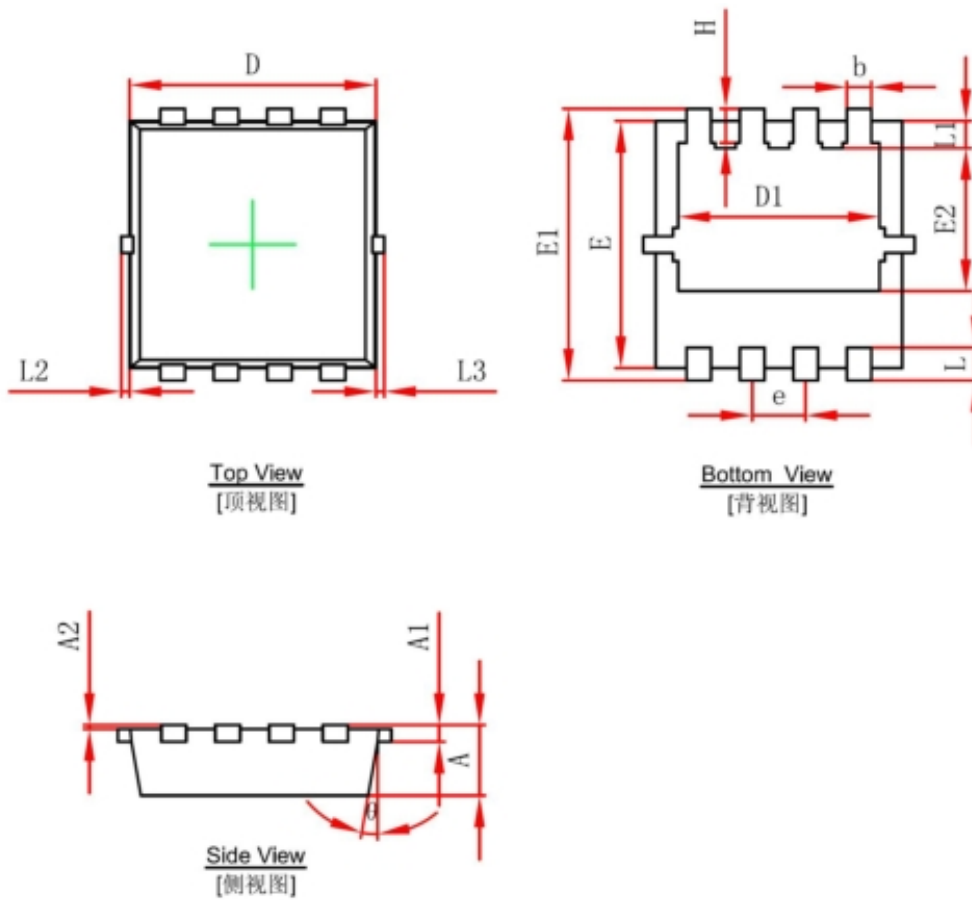
Safe Operation Area

ID Current Derating



Normalized Maximum Transient Thermal Impedance

## PDFNWB3.3×3.3-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	2.300	2.600	0.091	0.102
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°