

NCE Automotive P-Channel Enhancement Mode Power MOSFET

Description

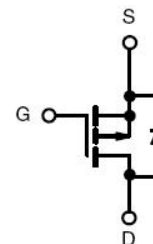
The NCEA60P82AK uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is well suited for high current load applications.

General Features

- $V_{DS} = -60V, I_D = -82A$
 $R_{DS(ON)} < 13m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 16m\Omega @ V_{GS} = -4.5V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- 100% UIS tested
- 100% ΔV_{ds} tested
- **AEC-Q101 qualified**

Application

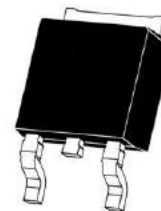
- Automotive application
- Load switch



Schematic diagram



Marking and pin assignment



TO-252-2L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
A60P82AK	NCEA60P82AK	TO-252-2L	-	-	-

Absolute Maximum Ratings ($T_c = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-82	A
	$I_D(100^\circ C)$	-58	A
Pulsed Drain Current (Note 1)	I_{DM}	-328	A
Maximum Power Dissipation	P_D	150	W
Derating factor		1.0	W/ $^\circ C$
Single pulse avalanche energy (Note 5)	E_{AS}	722	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	1.0	$^\circ C/W$
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Electrical Characteristics (T_c=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.2	-1.8	-2.4	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-20A	-	11	13	mΩ
		V _{GS} =-4.5V, I _D =-20A	-	13	16	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-20A	-	25	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{iss}	V _{DS} =-30V, V _{GS} =0V, F=1.0MHz	-	5604	-	pF
Output Capacitance	C _{oss}		-	356	-	pF
Reverse Transfer Capacitance	C _{rss}		-	265	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-30V, R _L =1.5Ω, V _{GS} =-10V, R _G =3Ω	-	18	-	nS
Turn-on Rise Time	t _r		-	20	-	nS
Turn-Off Delay Time	t _{d(off)}		-	55	-	nS
Turn-Off Fall Time	t _f		-	35	-	nS
Total Gate Charge	Q _g	V _{DS} =-30, I _D =-20A, V _{GS} =-10V	-	62.1	-	nC
Gate-Source Charge	Q _{gs}		-	9.3	-	nC
Gate-Drain Charge	Q _{gd}		-	16.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-20A	-	-	-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-82	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = -20A	-	49	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = -100A/μs (Note 3)	-	71	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: T_J=25°C, V_{DD}=-30V, V_G=-10V, L=0.5mH, R_G=25Ω

Typical Electrical and Thermal Characteristics (Curves)

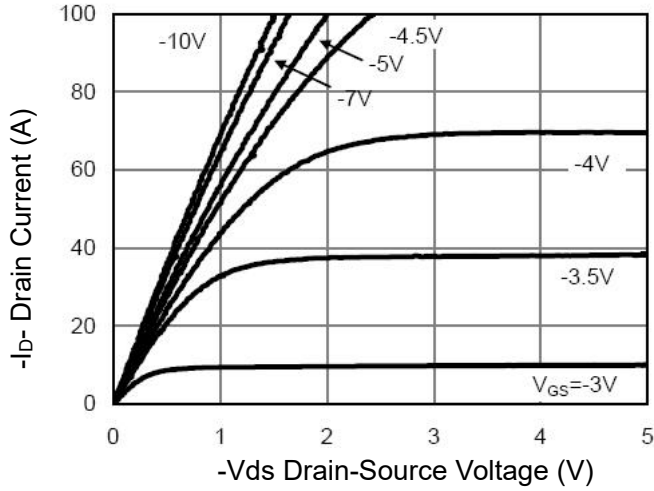


Figure 1 Output Characteristics

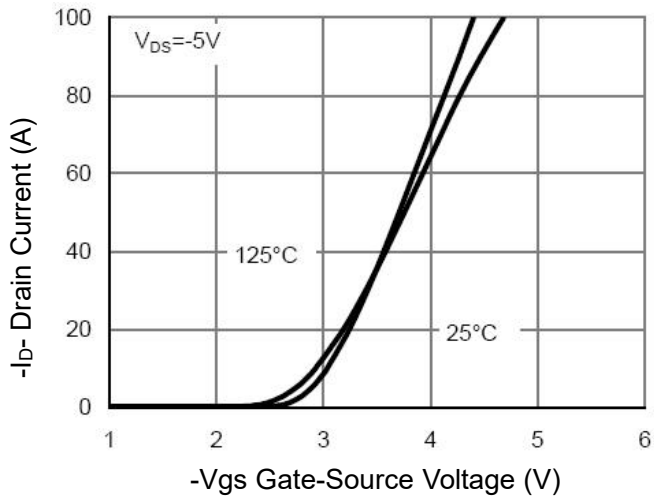


Figure 2 Transfer Characteristics

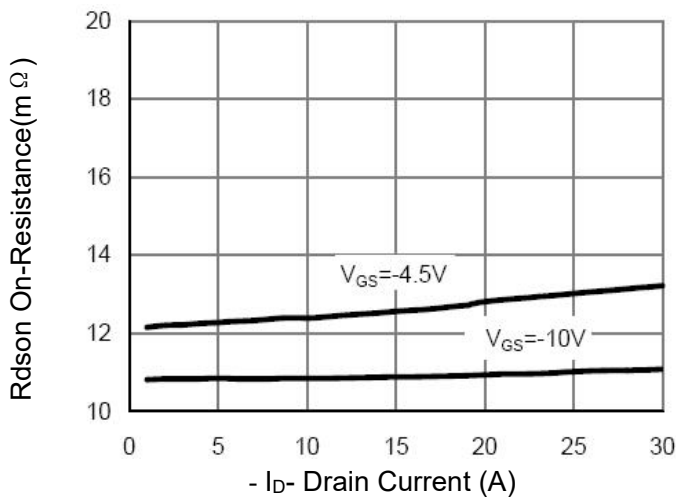


Figure 3 Rdson- Drain Current

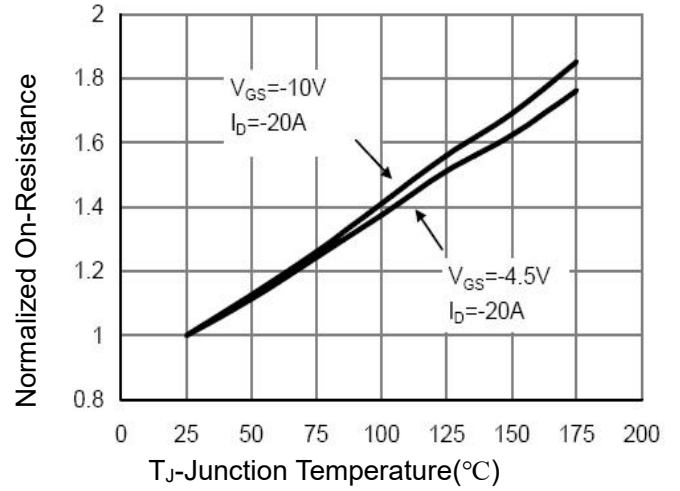


Figure 4 Rdson-Junction Temperature

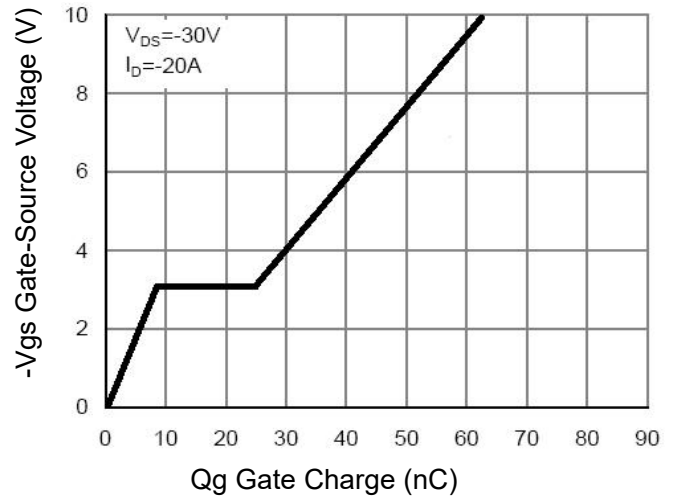


Figure 5 Gate Charge

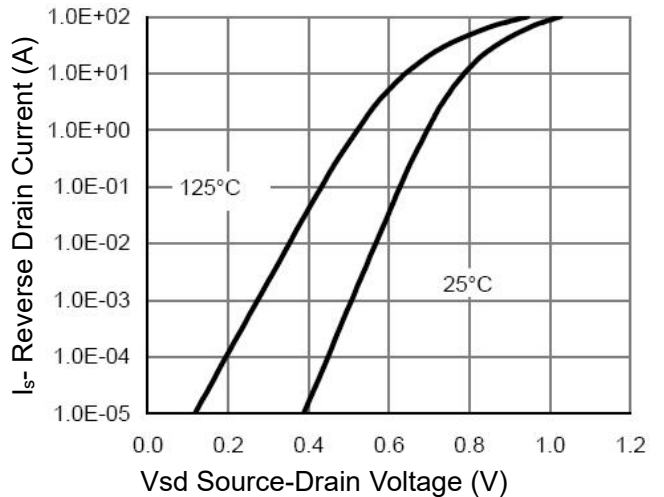


Figure 6 Source- Drain Diode Forward

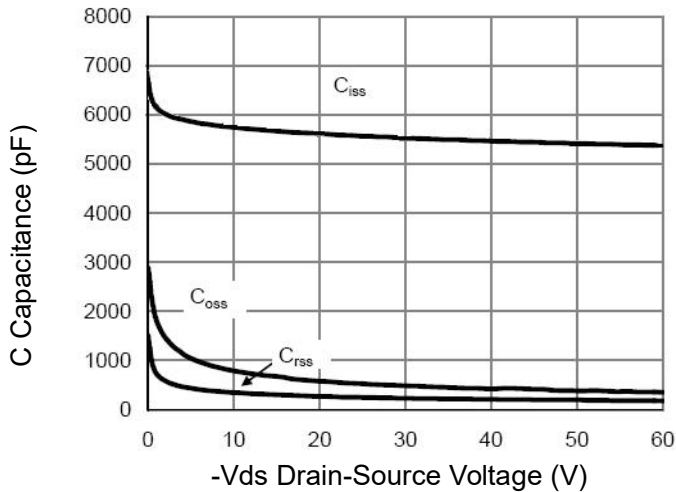


Figure 7 Capacitance vs Vds

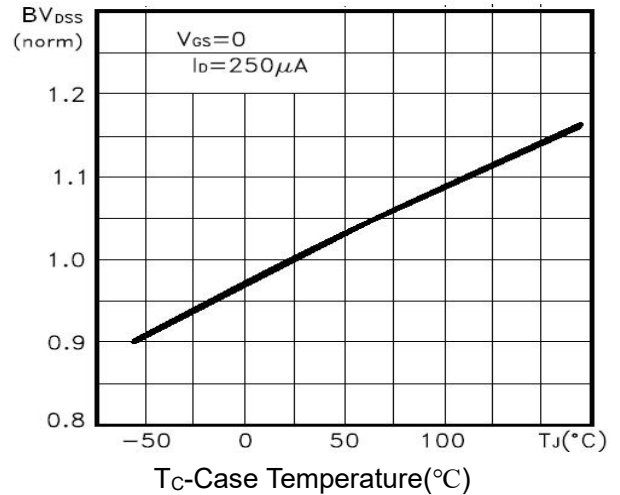


Figure 9 BV_{DSS} vs Junction Temperature

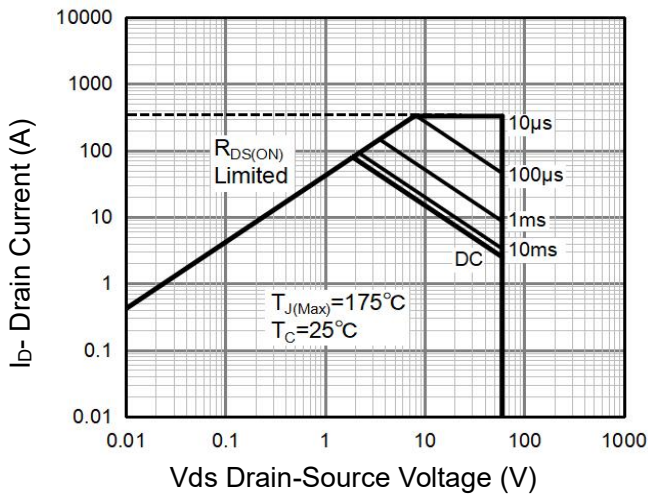


Figure 8 Safe Operation Area

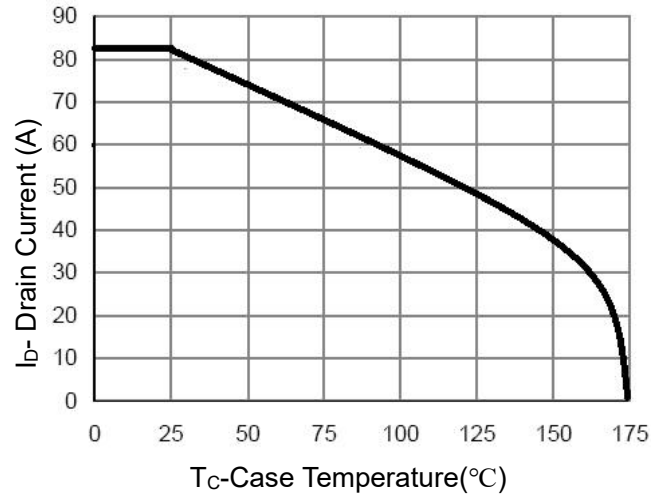


Figure 10 I_D Current Derating vs Junction Temperature

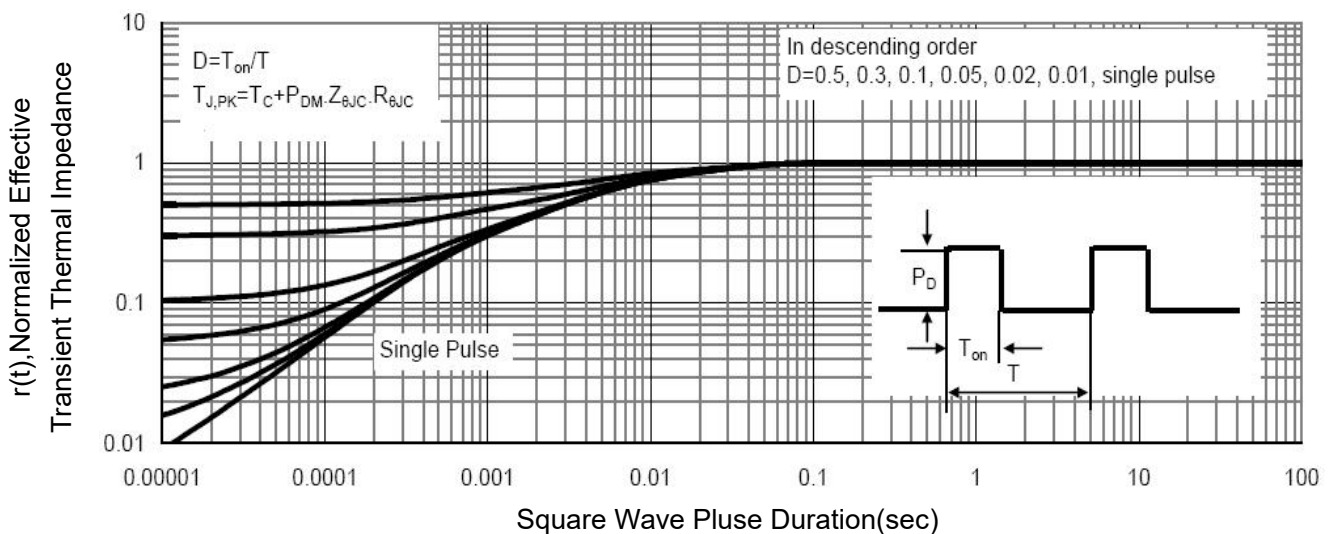
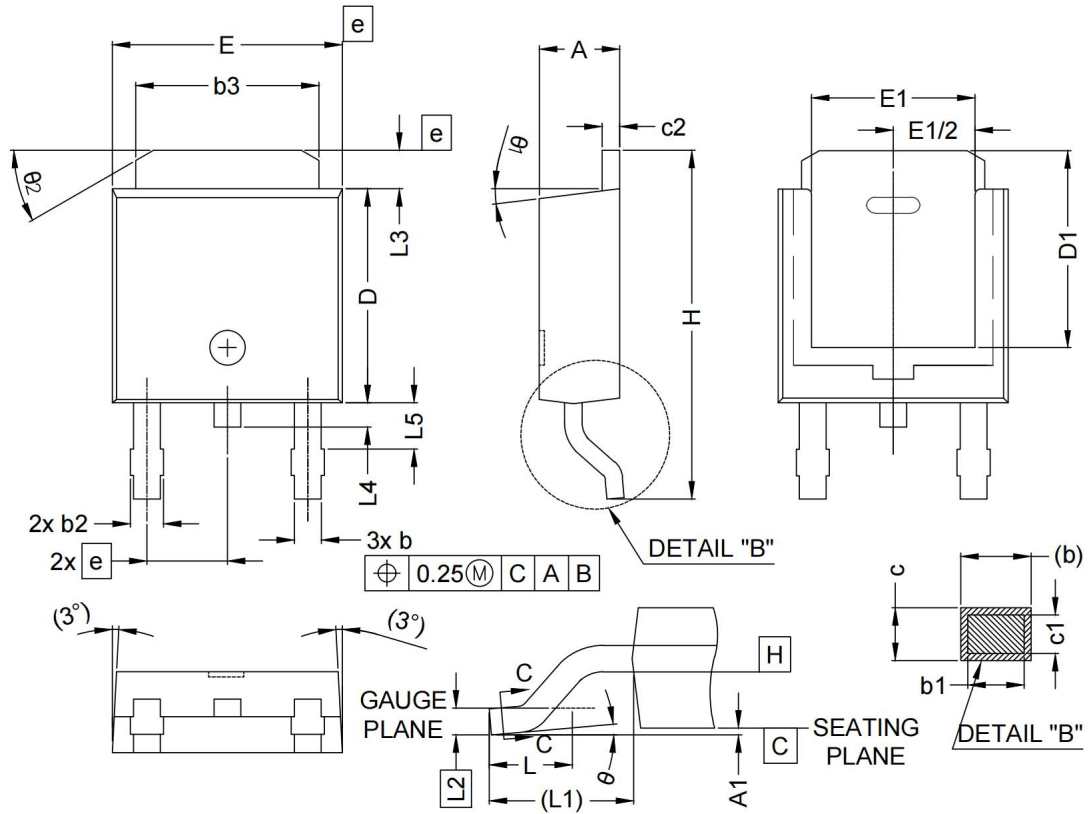


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252-2L Package Information



SYMBOL	MIN.	MAX.	SYMBOL	MIN.	MAX.	SYMBOL	MIN.	MAX.
A	2.18	2.39	E	6.35	6.73	$\theta 1$	0°	15°
A1	-	0.13	E1	4.32	-	$\theta 2$	25°	35°
b	0.65	0.89	e	2.29 BSC				
b1	0.64	0.79	H	9.94	10.34			
b2	0.76	1.13	L	1.50	1.78			
b3	4.95	5.46	L1	2.74 REF				
c	0.46	0.61	L2	0.51 BSC				
c1	0.41	0.56	L3	0.89	1.27			
c2	0.46	0.60	L4	-	1.02			
D	5.97	6.22	L5	1.14	1.49			
D1	5.21	-	θ	0°	10°			

NOTE ;
 1.0 DIMENSIONING & TOLERANCEING CONFIRM TO ASME Y14.5M-1994.
 2.0 ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES ARE IN DEGREES.
 3.0 HEAT SINK SIDE FLASH IS MAX. 0.8mm.
 4.0 RADIUS ON TERMINAL IS OPTIONAL.

Revision History

Revision	Date	Subjects
V1.0	2022.09.28	Product data sheet
V2.0	2024.02.22	Update SOA

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