

NCE Automotive N-Channel Enhancement Mode Power MOSFET

Description

The NCEA75H25 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

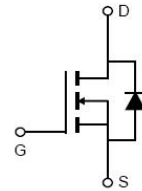
Application

- Automotive application
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

General Features

- $V_{DS} = 75V, I_D = 250A$
 $R_{DS(ON)} < 3.0m\Omega @ V_{GS}=10V$ (Typ:2.5m Ω)
- 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
- 175 °C operating temperature
- Pb-free lead plating;RoHscompliant
- Halogen-free according to IEC61249-2-21
- 100% UIS tested
- 100% ΔV_{ds} tested
- **AEC-Q101 qualified**

TO-220-3L



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
A75H25	NCEA75H25	TO-220-3L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	75	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	250	A
Drain Current-Continuous($T_C=100^\circ C$)	$I_D(100^\circ C)$	177	A
Pulsed Drain Current	I_{DM}	1000	A
Maximum Power Dissipation	P_D	371	W
Derating factor		2.47	W/ $^\circ C$
Single pulse avalanche energy (Note 1)	E_{AS}	2880	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.40	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient (Note 4)	$R_{\theta JA}$	40	$^\circ C/W$

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	75	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =85V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.5	2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	2.5	3	mΩ
		V _{GS} =4.5V, I _D =20A	-	3.5	4.2	mΩ
Forward Transconductance	g _{FS}	V _{DS} =20V, I _D =20A	-	70	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =35V, V _{GS} =0V, F=1.0MHz	-	14722	-	pF
Output Capacitance	C _{oss}		-	1012	-	pF
Reverse Transfer Capacitance	C _{rss}		-	883	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =35V, R _L =1Ω V _{GS} =10V, R _{GEN} =2.5Ω	-	26	-	nS
Turn-on Rise Time	t _r		-	69	-	nS
Turn-Off Delay Time	t _{d(off)}		-	128	-	nS
Turn-Off Fall Time	t _f		-	40	-	nS
Total Gate Charge	Q _g	V _{DS} =35V, I _D =20A, V _{GS} =10V	-	311	-	nC
Gate-Source Charge	Q _{gs}		-	40.5	-	nC
Gate-Drain Charge	Q _{gd}		-	77	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	-	-	1.2	V
Diode Forward Current	I _S	-	-	-	250	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 20A di/dt = 100A/μs	-	96	-	nS
Reverse Recovery Charge	Q _{rr}		-	380	-	nC

Notes:

1. EAS condition : T_j=25°C, V_{DD}=40V, V_G=10V, L=0.5mH, R_g=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=175°C. The SOA curve provides a single pulse rating.
4. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The maximum allowed junction temperature of 175° C. The value in any given application depends on the user's specific board design.

Typical Electrical and Thermal Characteristics (Curves)

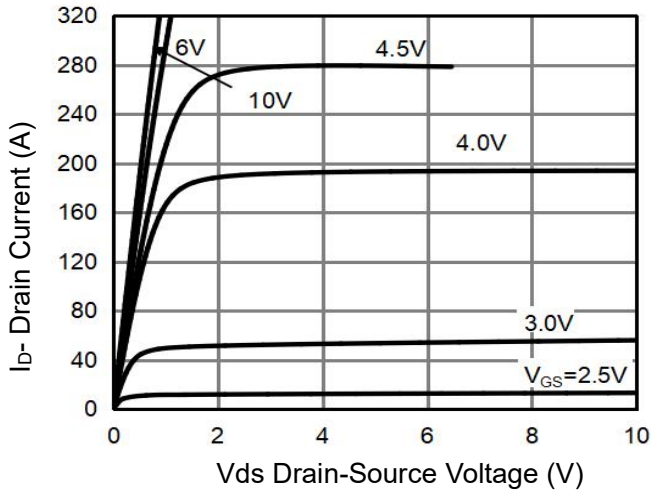


Figure 1 Output Characteristics

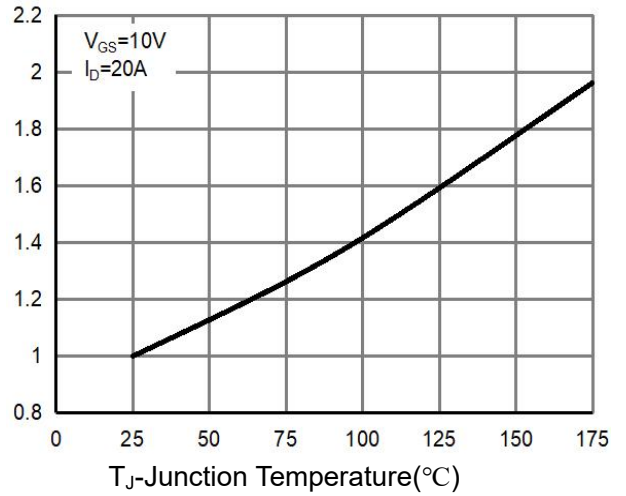


Figure 4 R_{dson} -Junction Temperature

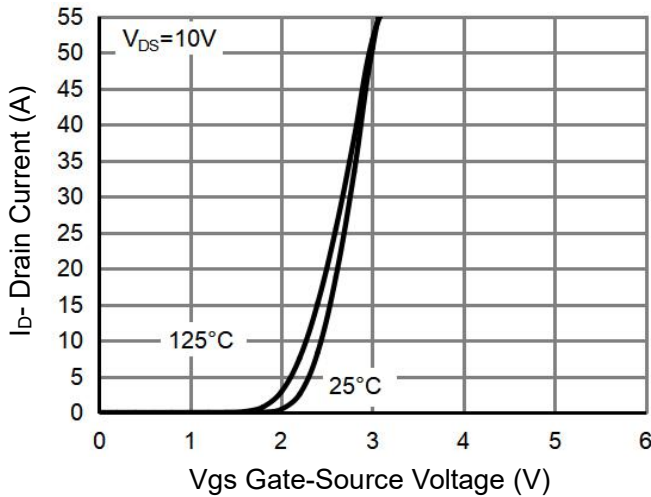


Figure 2 Transfer Characteristics

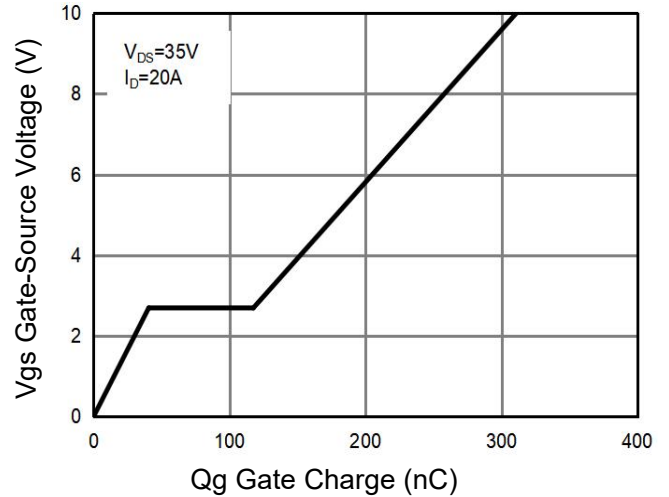


Figure 5 Gate Charge

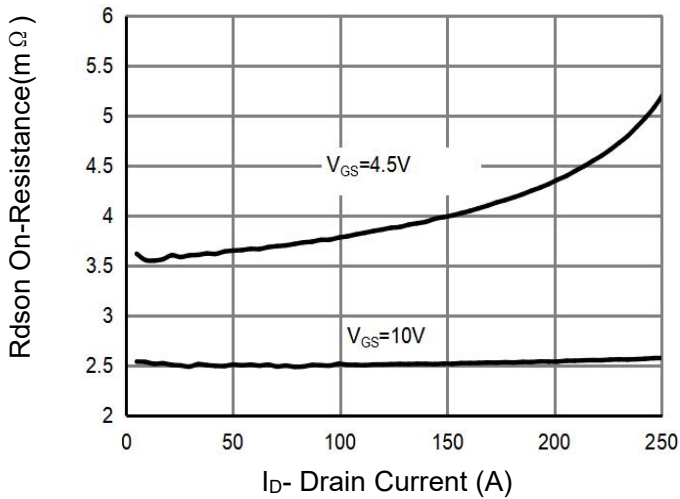


Figure 3 R_{dson} - Drain Current

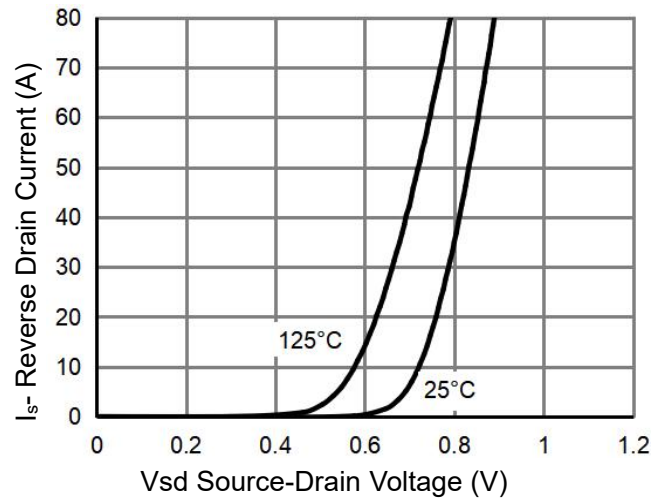


Figure 6 Source- Drain Diode Forward

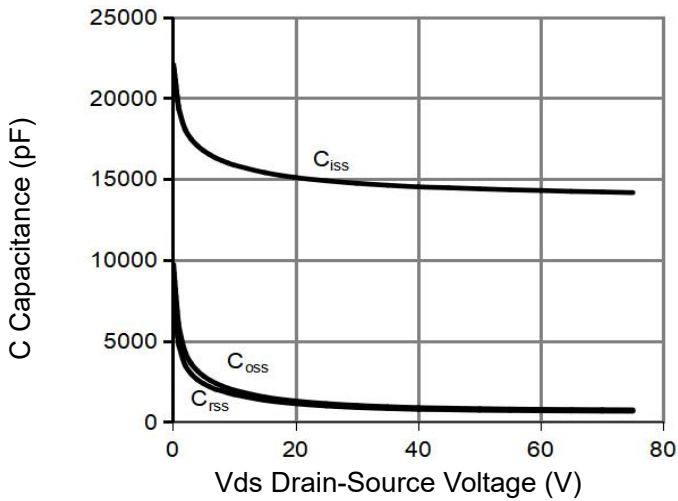


Figure 7 Capacitance vs Vds

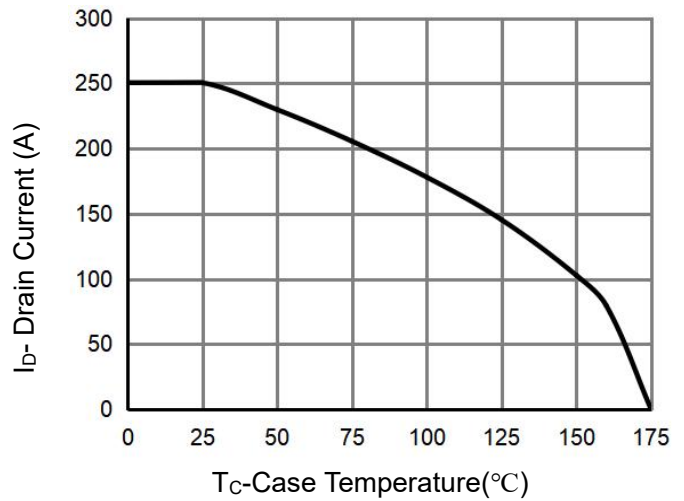


Figure 9 Current De-rating

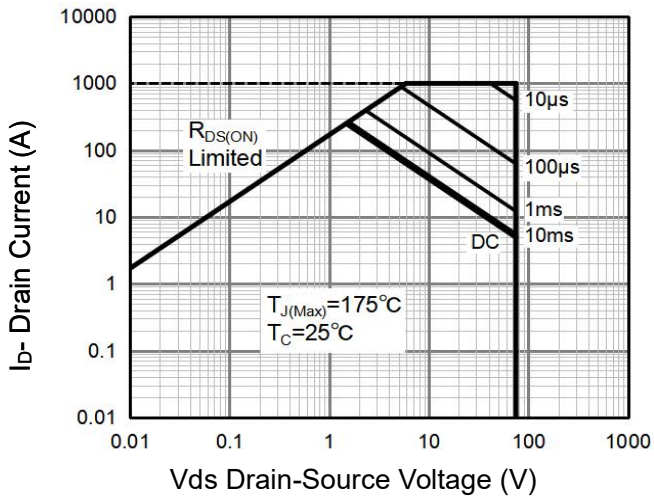


Figure 8 Safe Operation Area (Note3)

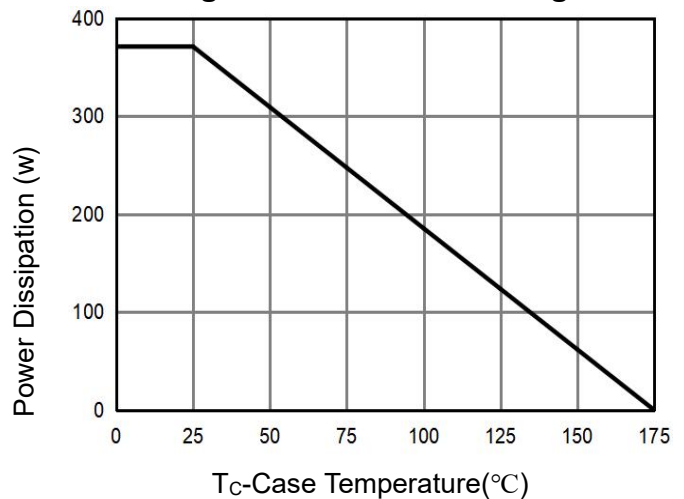


Figure 10 Power De-rating

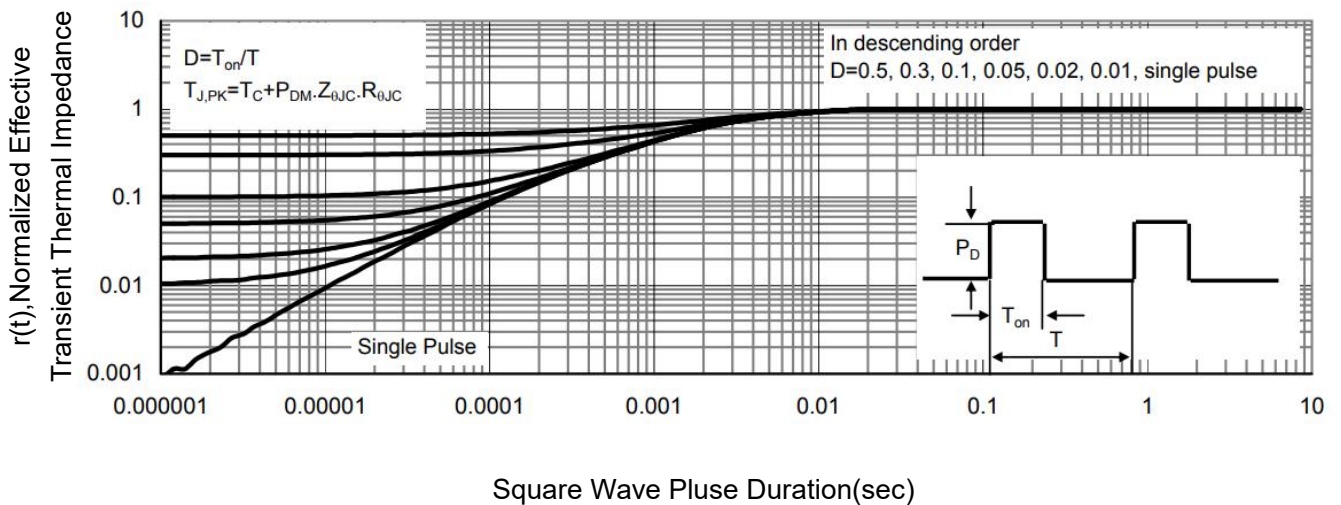
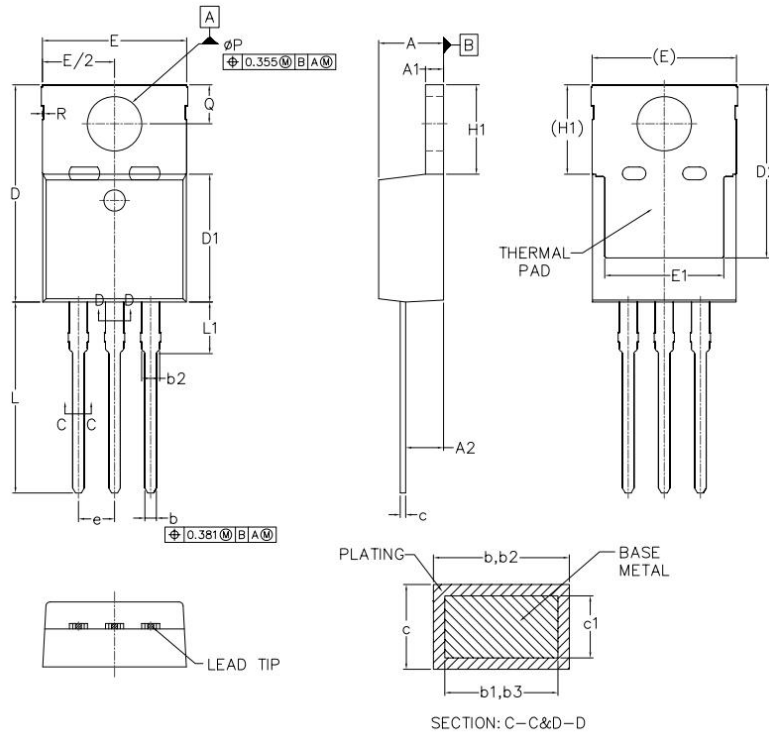


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



SYMBOLS	COMMON	
	MM	
	MIN.	MAX.
A	3.556	4.826
A1	0.508	1.397
A2	2.032	2.921
b	0.381	1.016
b1	0.381	0.965
b2	1.143	1.778
b3	1.143	1.727
c	0.356	0.610
c1	0.356	0.559
D	14.224	16.510
D1	8.382	9.017
D2	12.042	12.878
E	9.652	10.668
E1	6.858	8.890
e	2.540 BSC.	
H1	5.842	6.858
L	12.700	14.732
L1	3.560	4.060
øP	3.810	3.860
Q	2.540	3.048
R	0.127 BSC	

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