

SuperMOS –PDFN5*6-8L 40V BV_{DSS}, 5.5mΩ R_{DS(ON)}, N-channel MOSFET

1. Description

The NCEP4045GU-ES is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS(ON)} with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product NCEP4045GU-ES is Pb-free.

2. Features

- 40V, R_{DS(ON)}=5.5mΩ(Typ.) @V_{GS}=10V
- R_{DS(ON)}=9.0mΩ(Typ.) @V_{GS}=4.5V
- High density cell design for low R_{DS(on)}
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications


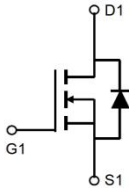
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per Reel	Flammability Rating	Reel Size
NCEP4045GU-ES	PDFN5*6-8L	NJ04R075/LOT	Halogen free	Tape & Reel	5,000 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
4	Gate		
1/2/3	Source		
5/6/7/8	Drain		

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	BV_{DSS}	40	V	
Gate-Source Voltage	V_{GS}	±20	V	
Continuous Drain Current	I_D	$T_C=25^{\circ}C$	59	A
		$T_C=75^{\circ}C$	46	
Maximum Power Dissipation	P_D	44.6	W	
Pulsed Drain Current	I_{DM}	236	A	
Single Pulse Avalanche Current ¹	I_{AS}	15	A	
Single Pulse Avalanche Energy ¹	E_{AS}	56	mJ	
Operating Junction Temperature	T_J	150	°C	
Lead Temperature	T_L	260	°C	
Storage Temperature Range	T_{stg}	-55 to 150	°C	

Thermal resistance ratings

Single Operation				
Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Case Thermal Resistance	$R_{\theta JC}$		2.8	°C/W

Notes:

1: The EAS test condition is $T_J=25^{\circ}C$, $V_{DD}=20V$, $V_{GS}=10V$, $L=0.5mH$, $R_g=25\Omega$

Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V$			1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.7	2.5	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		5.5	7.5	m Ω
		$V_{GS}=4.5V, I_D=20A$		9	12	
Forward transconductance	g_{fs}	$V_{DS}=5V, I_D=30A$			100	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, f=1MHz,$ $V_{DS}=20V$		2400		pF
Output Capacitance	C_{OSS}			190		
Reverse Transfer Capacitance	C_{RSS}			165		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=20V,$ $I_D=25A$		45		nC
Gate-to-Source Charge	Q_{GS}			8.2		
Gate-to-Drain Charge	Q_{GD}			9.9		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}=20V,$ $I_D=25A, R_L=1.2\Omega,$ $R_G=3\Omega$		12		ns
Rise Time	t_r			15		
Turn-Off Delay Time	$t_{d(OFF)}$			52		
Fall Time	t_f			103		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=30A$			1.5	V

7. Typical Characteristic

Figure 1: Output Characteristics

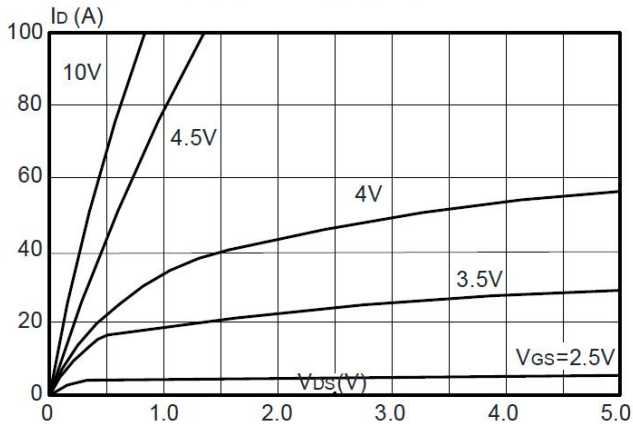


Figure 2: Typical Transfer Characteristics

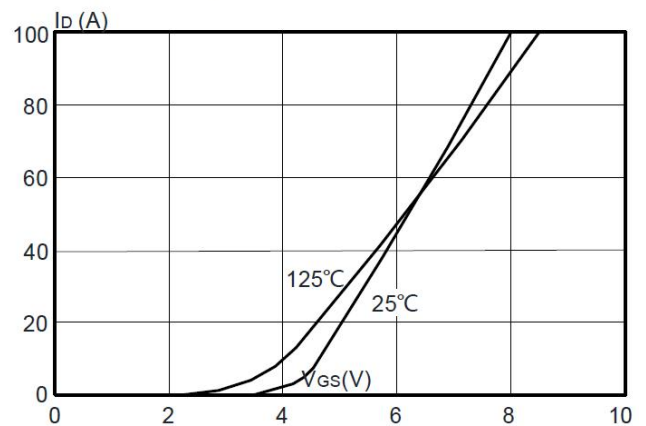


Figure 3: On-resistance vs. Drain Current

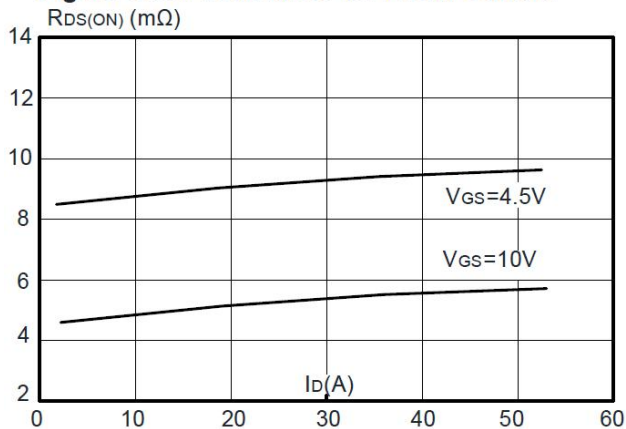


Figure 4: Body Diode Characteristics

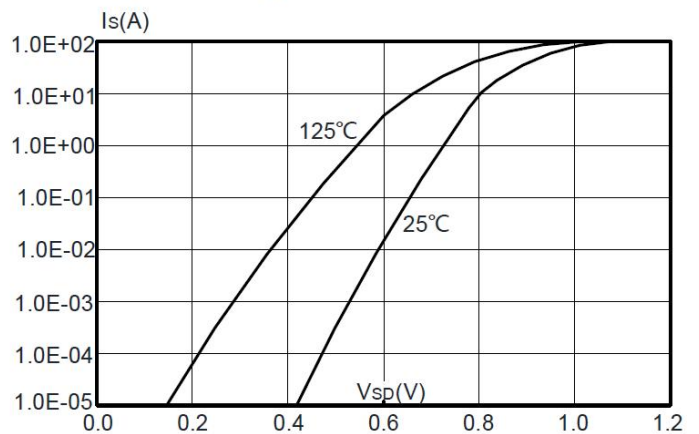


Figure 5: Gate Charge Characteristics

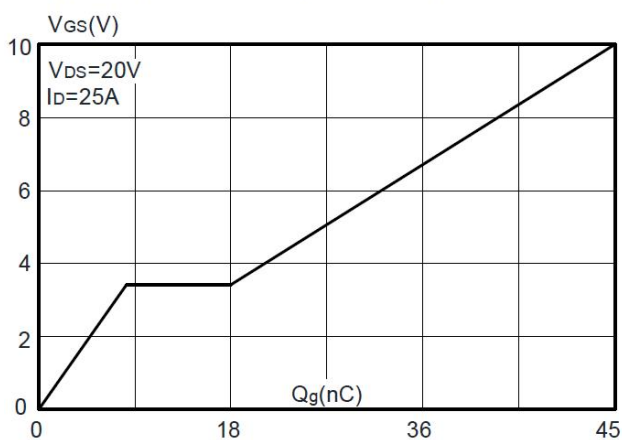


Figure 6: Capacitance Characteristics

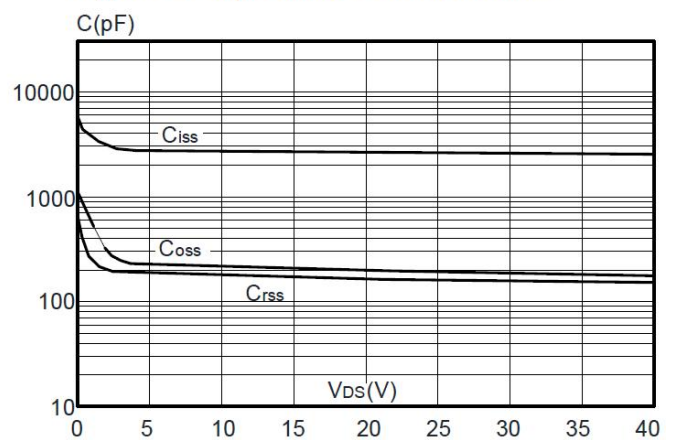


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

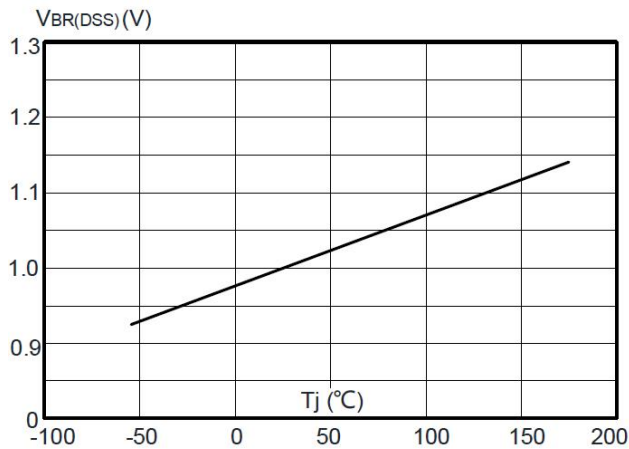


Figure 8: Normalized on Resistance vs. Junction Temperature

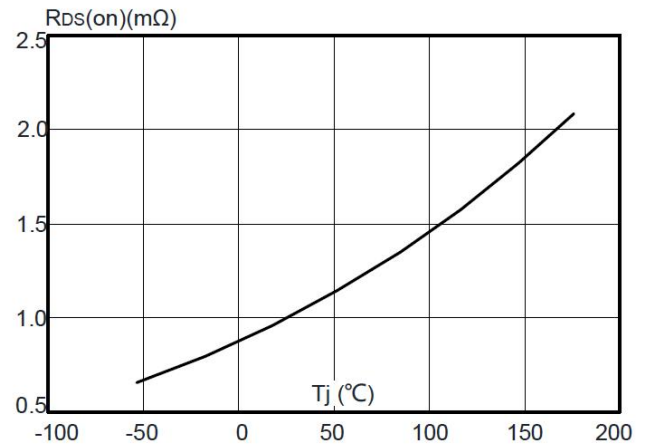


Figure 9: Maximum Safe Operating Area

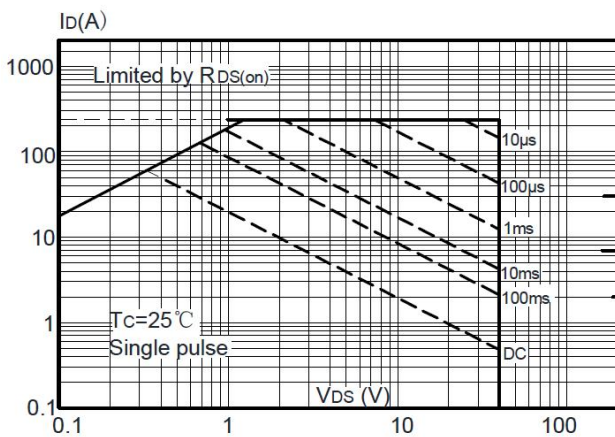


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

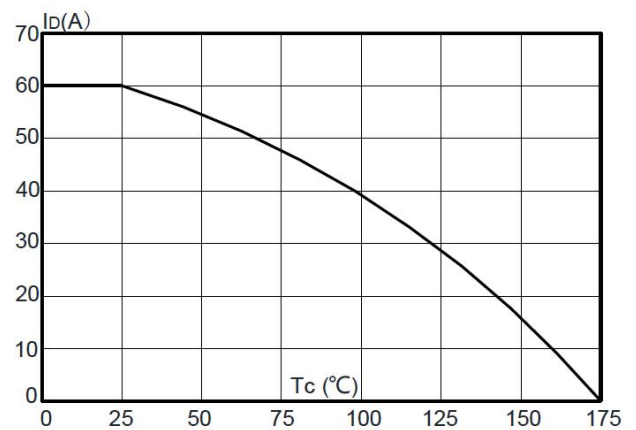
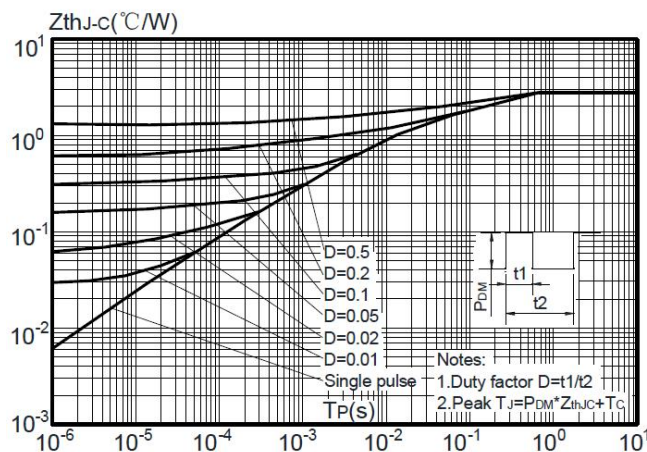
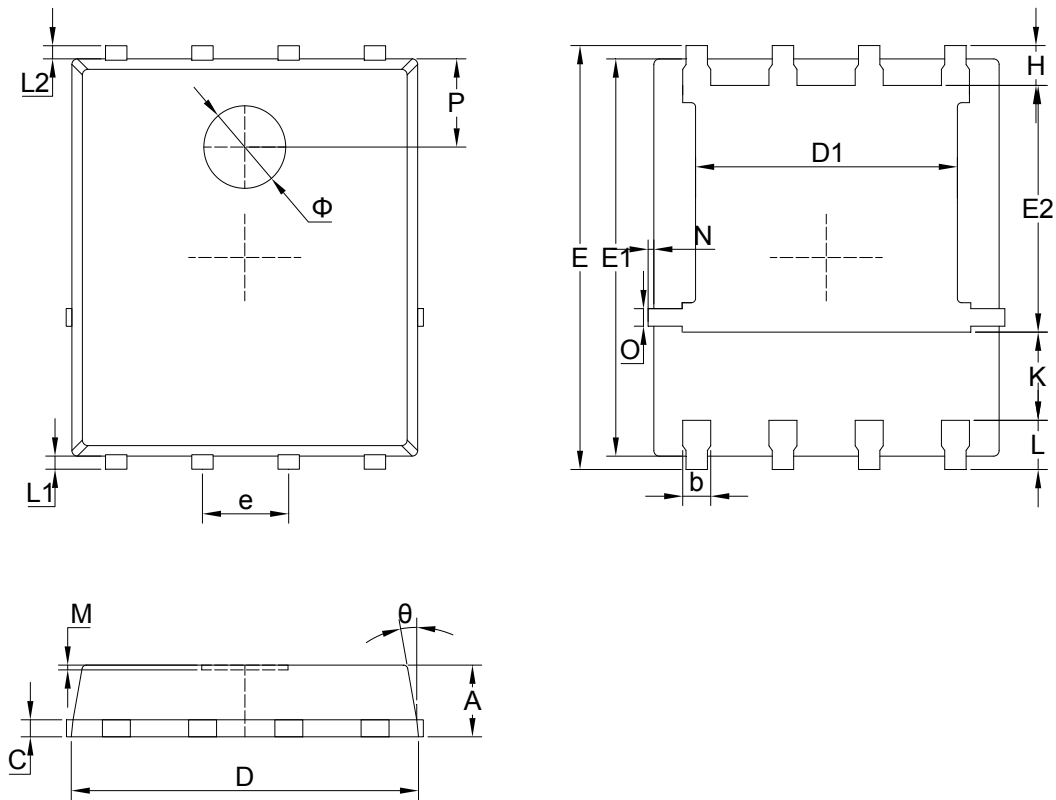


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



8. Dimension (PDFN5*6-8L)



Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.90	1.05	1.20	H	0.48	0.58	0.68
b	0.35	0.40	0.50	K	1.17	1.27	1.37
C	0.20	0.25	0.35	L	0.64	0.74	0.84
D	4.90	5.05	5.20	L1/L2	0.20 REF.		
D1	3.72	3.82	3.92	θ	8°	10°	12°
E	6.00	6.15	6.30	M	0.08 REF.		
E1	5.60	5.75	5.90	N	0	-	0.15
E2	3.47	3.57	3.67	O	0.25 REF.		
e	1.27 BSC.			P	1.28 REF.		
Φ	1.20 REF.						

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