

SuperMOS – TO-220 68V BV_{DSS} , $6.6m\Omega R_{DS(ON)}$, N-channel MOSFET

1. Description

The ESNU07R086 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 ESNU07R086 is Pb-free.

2. Features

- 68V, $R_{DS(ON)}=6.6m\Omega(Typ.) @V_{GS}=10V$
- Use trench MOSFET technology
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

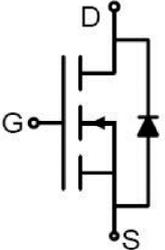
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per Tube	Flammability Rating
ESNU07R086	TO-220	ESNU07R086/lot	Halogen free	Tube	50 PCS	UL 94V-0

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate	Note b 	
3	Source		
2	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}	68	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	80
		$T_C=75^\circ\text{C}$	52
Maximum Power Dissipation	P_D	147	W
Pulsed Drain Current	I_{DM}	320	A
Avalanche Current, Single Pulsed ^a	I_{AS}	22	A
Avalanche Energy, Single Pulsed ^a	E_{AS}	121	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	$R_{\theta JC}$		0.85	°C/W

Note:

a: $T_J=25^\circ\text{C}$, $V_{DD}=35\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_g=25\Omega$.

b: This diagram is only an electrical schematic, and the actual pin size is based on POD.

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}	$V_{GS}=0V, I_D=250\mu A$	68			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=68V, V_{GS}=0V$			1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.0	2.9	4.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		6.6	8.6	m Ω
Forward transconductance	g_{fs}	$V_{DS}=5V, I_D=30A$			150	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, f=1MHz,$ $V_{DS}=25V$		4065		pF
Output Capacitance	C_{OSS}			266		
Reverse Transfer Capacitance	C_{RSS}			230		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=30V,$ $I_D=20A$		35		nC
Gate-to-Source Charge	Q_{GS}			11		
Gate-to-Drain Charge	Q_{GD}			9		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}=30V,$ $I_D=20A, R_G=3\Omega$		15		ns
Rise Time	t_r			95		
Turn-Off Delay Time	$t_{d(OFF)}$			48		
Fall Time	t_f			33		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=30A$			1.5	V

7. Typical Characteristic

Figure 1: Output Characteristics

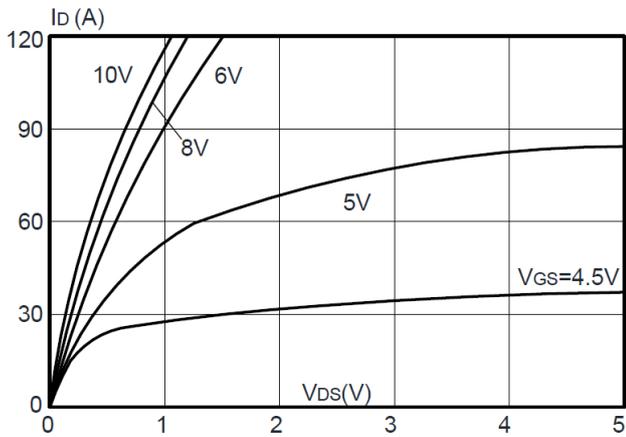


Figure 2: Typical Transfer Characteristics

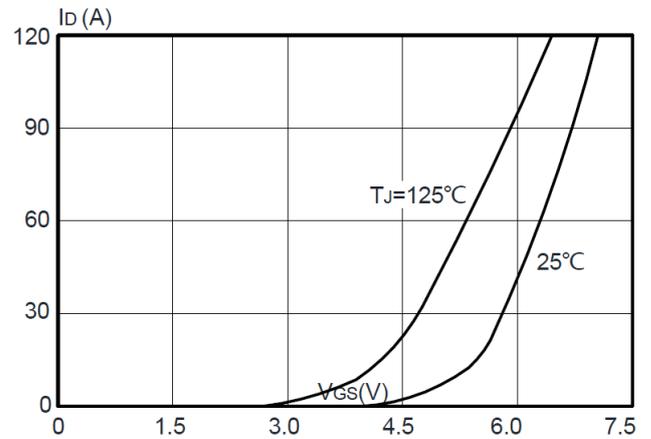


Figure 3: On-resistance vs. Drain Current

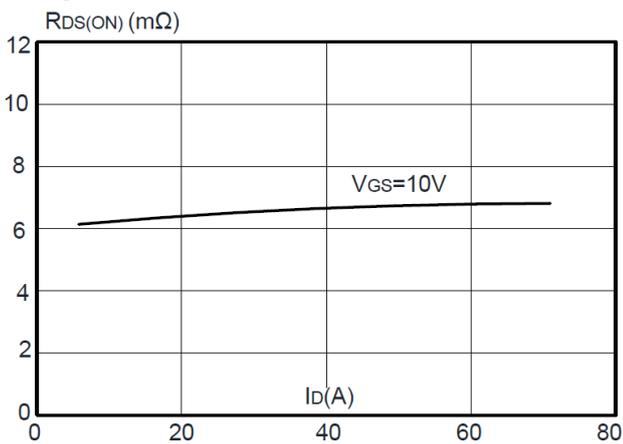


Figure 4: Body Diode Characteristics

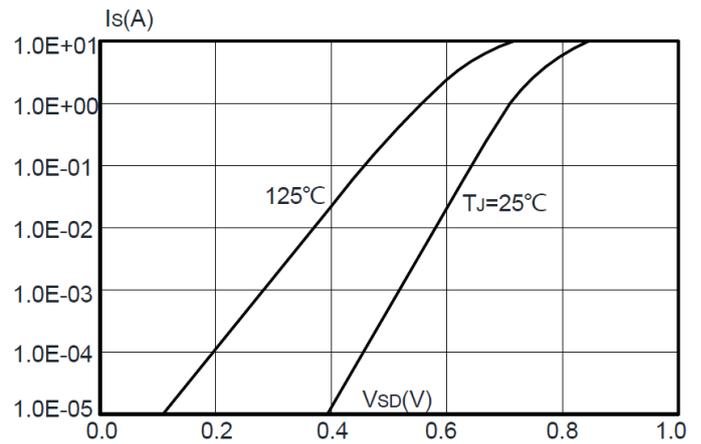


Figure 5: Normalized on Resistance vs. Junction Temperature

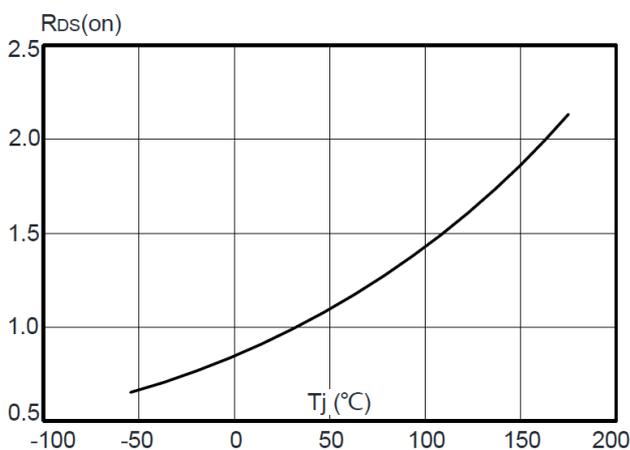
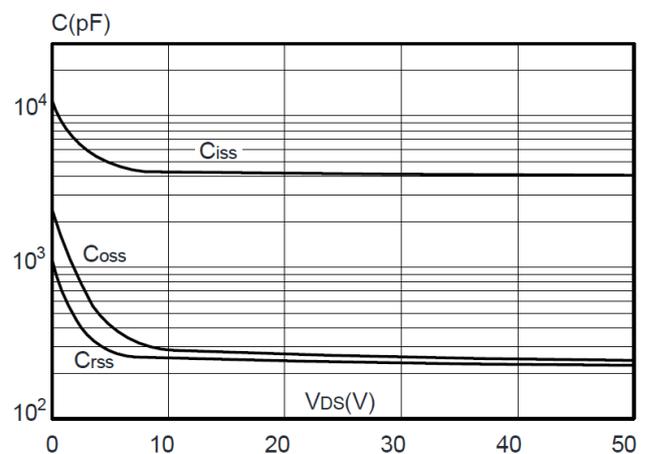
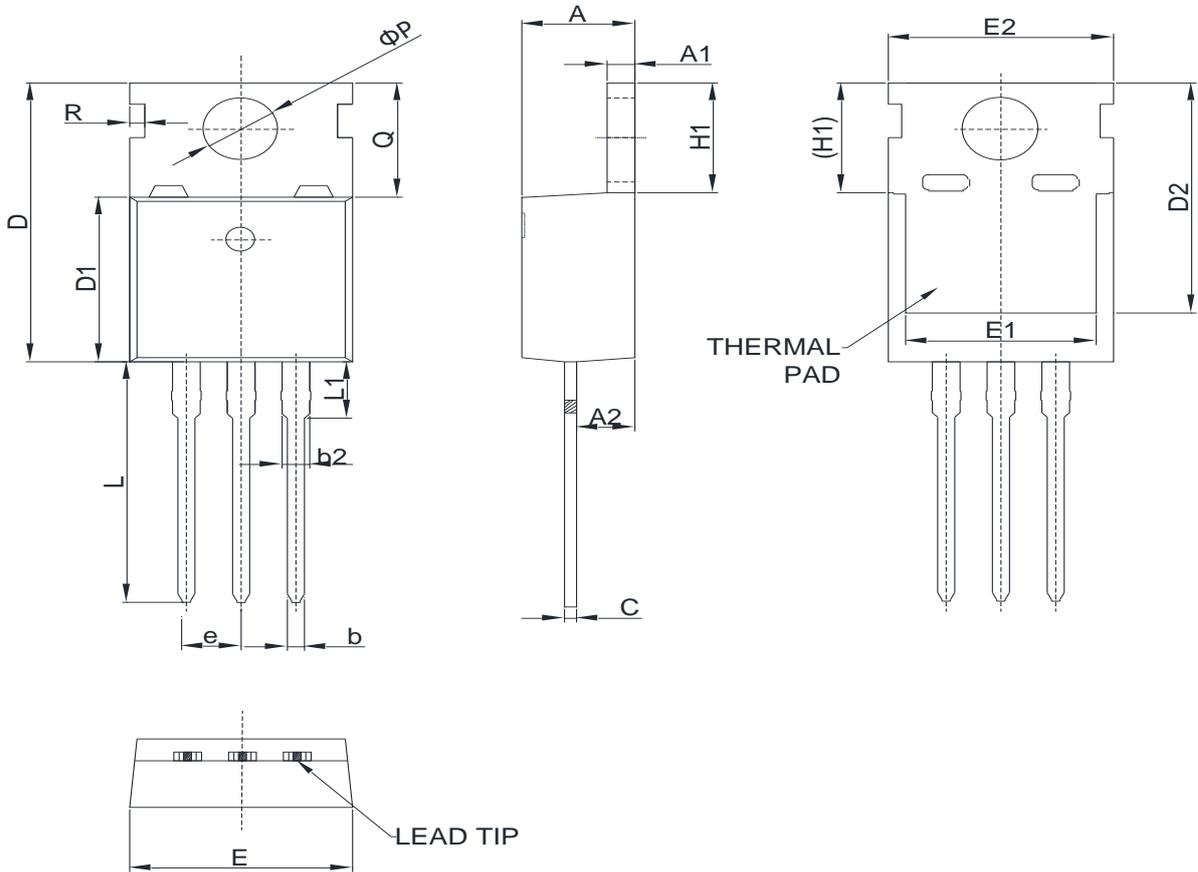


Figure 6: Capacitance Characteristics



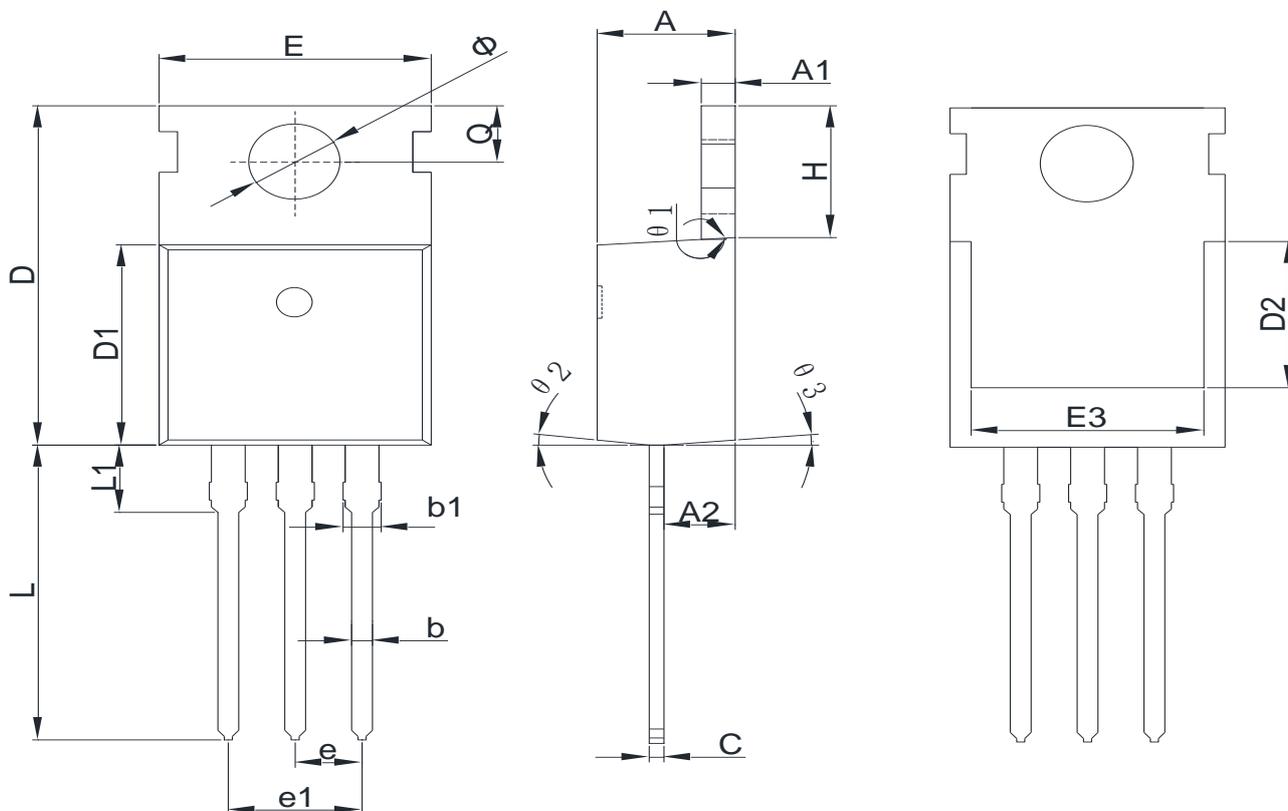
8. Dimension (TO-220)

POD A(Q)



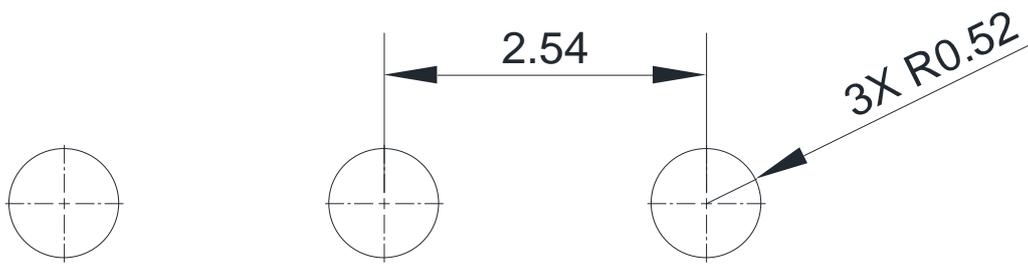
COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	4.47	4.57	4.67	L1	3.56	3.76	3.96
A1	1.17	1.27	1.37	L	13.15	13.45	13.75
A2	2.52	2.67	2.82	H1	6.00	6.30	6.60
c	0.360	0.381	0.500	P	3.70	3.84	3.95
D	15.00	15.30	15.60	Q	2.60	2.74	2.90
D1	8.70	9.00	9.30	R	0.00	0.20	0.35
D2	12.19	12.39	12.60	E1	7.98	8.18	8.48
E	9.70	9.92	10.30	b	0.71	0.81	0.91
E2	9.85	10.00	10.15	b2	1.17	1.27	1.37
e	2.44	2.54	2.64				

POD B(X)



MILLIMETERS							
SYMBOLS	MIN	TYP	MAX	SYMBOLS	MIN	TYP	MAX
A	4.37	4.57	4.70	E	9.70	10.00	10.30
A1	1.25	1.30	1.40	E3	7.00	7.60REF	
A2	2.15	2.35	2.55	e	2.54BSC		
b	0.70	0.80	0.95	e1	5.08BSC		
b1	1.17	1.27	1.47	H	6.25	6.50	6.75
c	0.45	0.50	0.60	L	13.20	13.50	13.80
D	15.10	15.60	16.10	L1		3.10	3.40
D1	8.80	9.10	9.40	θ 1	7° TYP		
D2	5.50	6.30REF		θ 2	7° TYP		
Φ	3.40	3.60	3.80	θ 3	3° TYP		
Q	2.60	2.80	3.00				

9. Recommendation of Hole Pattern



DIMENSIONS: MILLIMETERS

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