

SuperMOS –TO-220 60V BV_{DSS} , 7.5m Ω $R_{DS(ON)}$, N-channel MOSFET

1. Description

The ESNU06R10 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced 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 ESNU06R10 is Pb-free.

2. Features

- 60V, $R_{DS(ON)}=7.5m\Omega(Typ.) @V_{GS}=10V$
- $R_{DS(ON)}=10m\Omega(Typ.) @V_{GS}=4.5V$
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

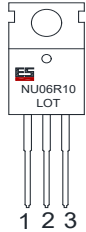
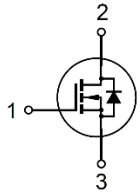
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per Tube	Flammability Rating
ESNU06R10	TO-220	NU06R10/LOT	Halogen free	Tube	50 PCS	UL 94V-0

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate		
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}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	58
		$T_C=100^\circ\text{C}$	38
Maximum Power Dissipation	P_D	70	W
Pulsed Drain Current	I_{DM}	232	A
Single Pulsed Avalanche Current ¹	I_{AS}	20	A
Single Pulsed Avalanche Energy ¹	E_{AS}	100	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	$R_{\theta JC}$		2.14	°C/W

Notes: 1. EAS condition : $T_J=25^\circ\text{C}$, $V_{DD}=30\text{V}$, $V_G=10\text{V}$, $L=0.5\text{mH}$, $R_G=25\Omega$, $I_{AS}=20\text{A}$

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}	$V_{GS}=0V, I_D=250\mu A$	60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$			1.0	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	2.2	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		7.5	10	m Ω
		$V_{GS}=4.5V, I_D=20A$		10	14	
Forward transconductance	g_{fs}	$V_{DS}=5V, I_D=10A$			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, f=1MHz,$ $V_{DS}=25V$		4020		pF
Output Capacitance	C_{OSS}			210		
Reverse Transfer Capacitance	C_{RSS}			115		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=30V,$ $I_D=30A$		78		nC
Gate-to-Source Charge	Q_{GS}			15		
Gate-to-Drain Charge	Q_{GD}			15		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}=30V,$ $I_D=30A, R_G=1.8\Omega$		13		ns
Rise Time	t_r			77		
Turn-Off Delay Time	$t_{d(OFF)}$			50		
Fall Time	t_f			105		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=30A$			1.5	V

7. Typical Characteristic

Figure1: Output Characteristics

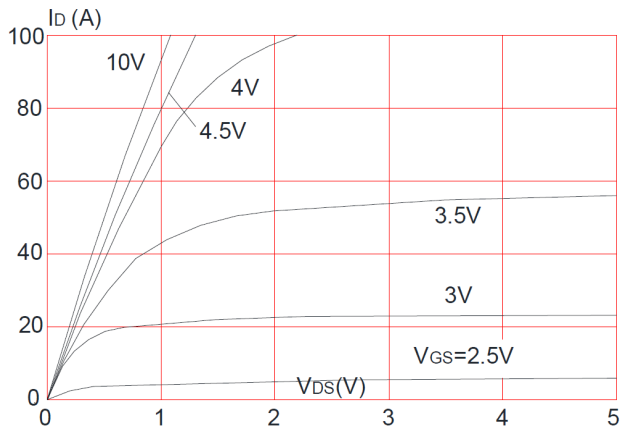


Figure 2: Typical Transfer Characteristics

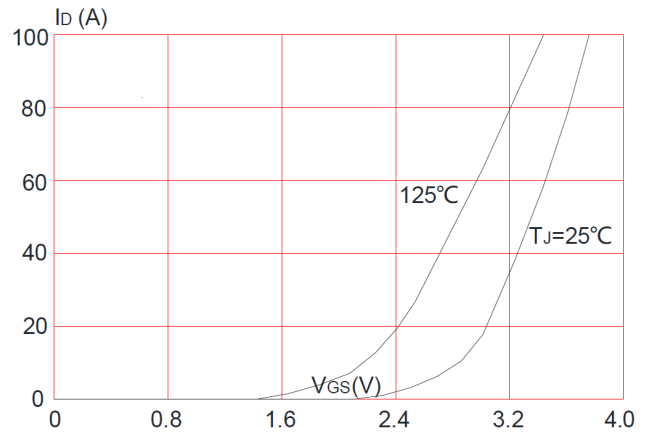


Figure 3: On-resistance vs. Drain Current

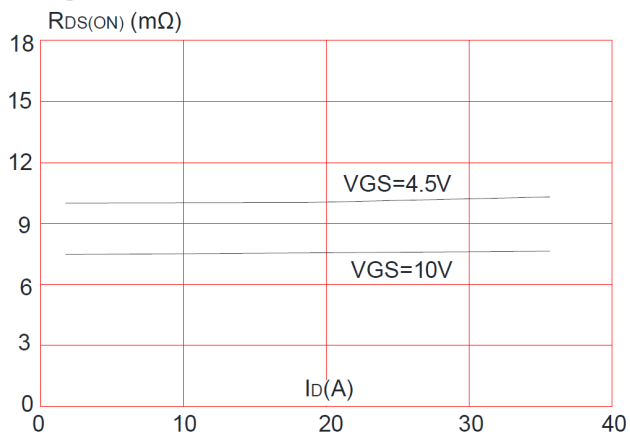


Figure 4: Body Diode Characteristics

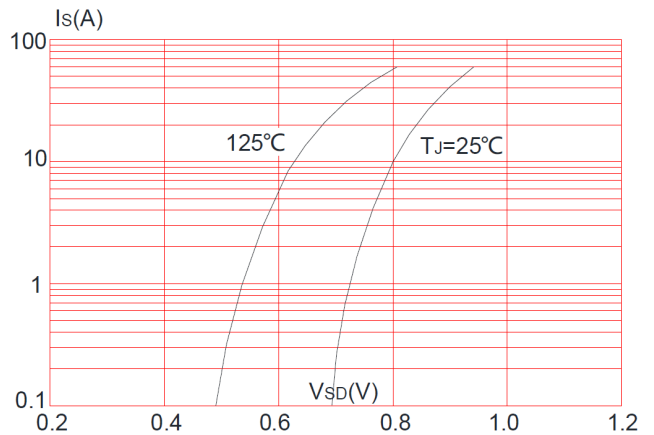


Figure 5: Gate Charge Characteristics

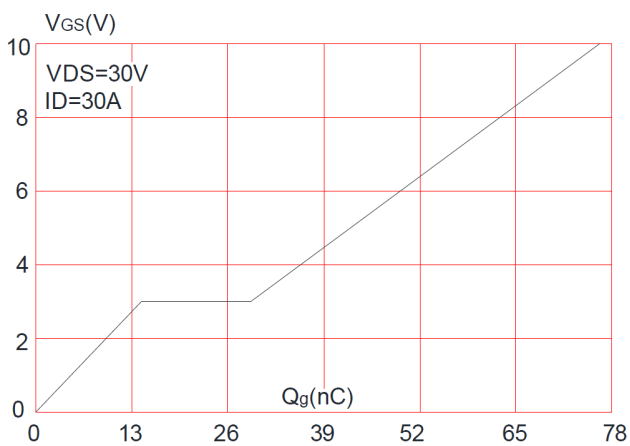


Figure 6: Capacitance Characteristics

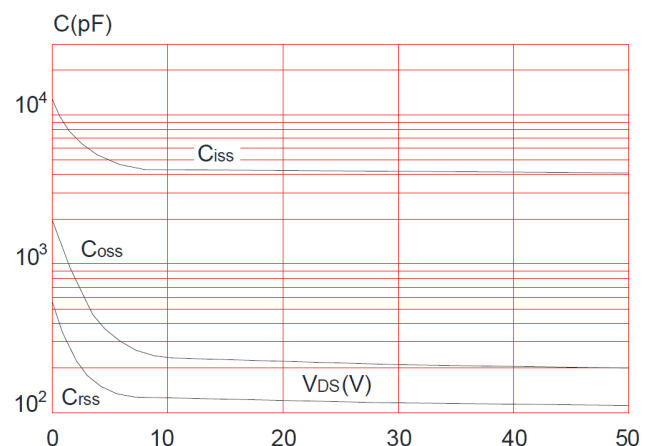


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

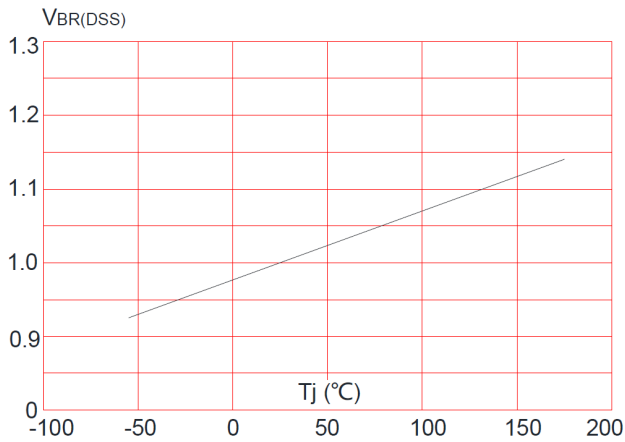


Figure 8: Normalized on Resistance vs. Junction Temperature

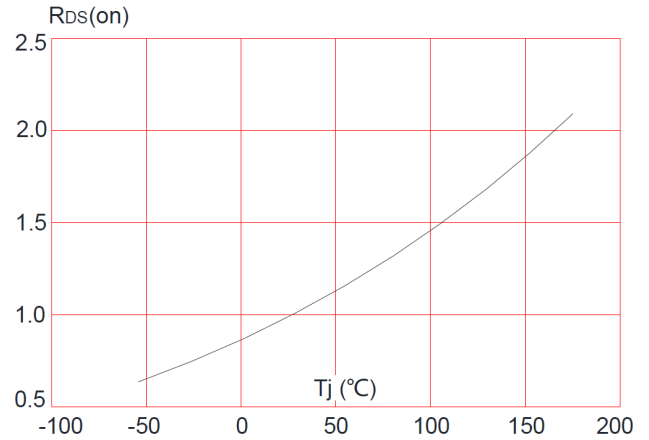


Figure 9: Maximum Safe Operating Area

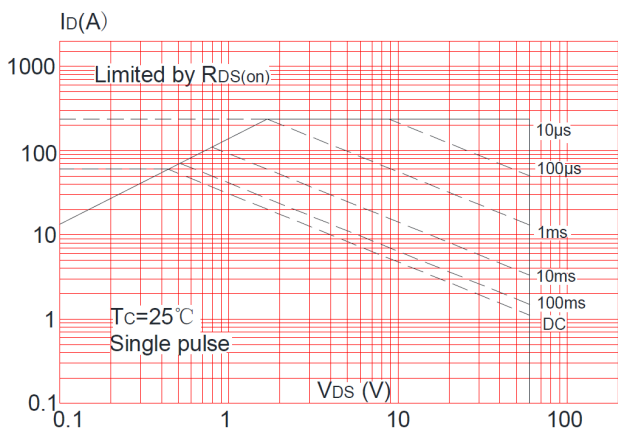


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

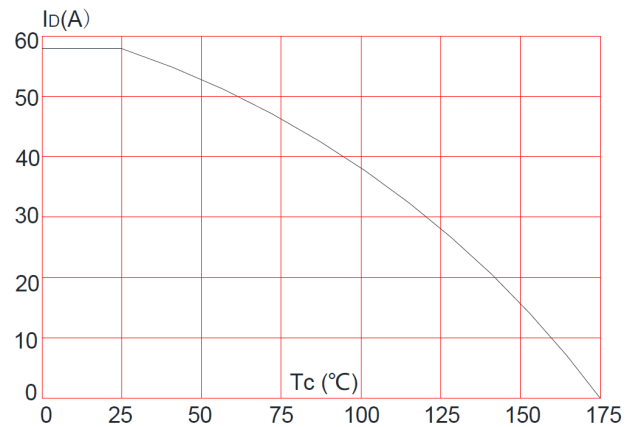
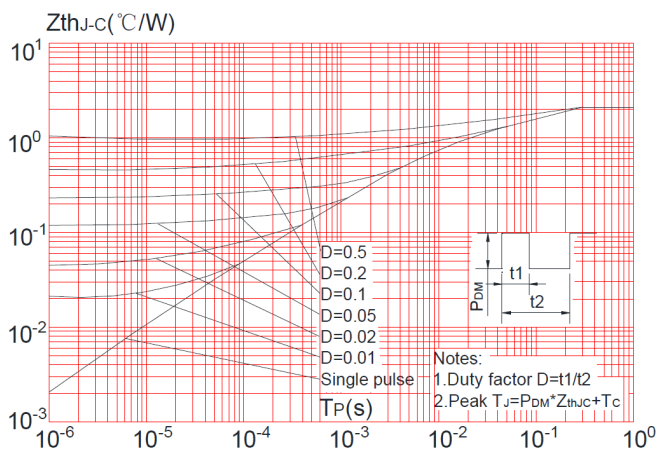
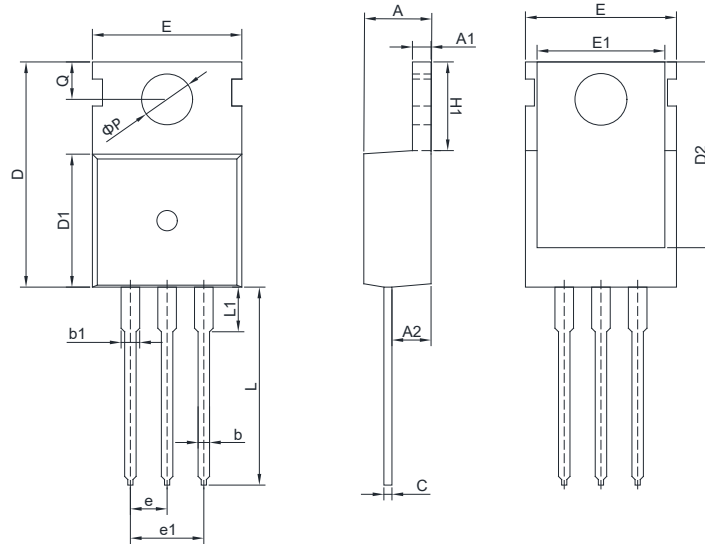


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



8. Dimension (TO-220)



COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

SYMBOLS	A	A1	A2	b	b1	c	D	D1	D2
MIN	4.25	1.25	2.35	0.7	1.15	0.45	14.35	8.80	13.05
MAX	4.65	1.35	2.55	0.9	1.75	0.60	15.95	9.50	13.65
SYMBOLS	E	E1	e	e1	H1	L	L1	Q	ΦP
MIN	9.90	7.85	2.540	5.080	6.30	12.85	2.85	2.70	3.50
MAX	10.35	8.85	BSC	BSC	6.65	13.50	3.25	2.90	3.70

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