

30V P-Channel Enhancement Mode MOSFET

Description

The NP4407 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in load switch and battery protection applications.

General Features

- ◆ $V_{DS} = -30V$, $I_D = -12A$
 $R_{DS(ON)}(Typ.) = 10m\Omega$ @ $V_{GS} = -10V$
 $R_{DS(ON)}(Typ.) = 14m\Omega$ @ $V_{GS} = -4.5V$
- ◆ High power and current handing capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

Application

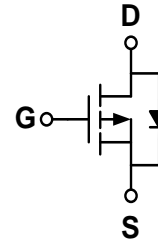
- ◆ Battery protection
- ◆ Load switch

Package

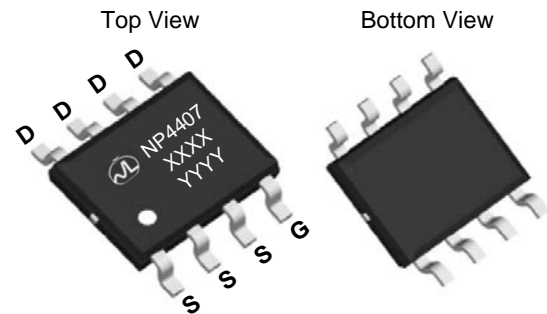
- ◆ SOP-8

100% UIS TESTED!
100% ΔV_{ds} TESTED!

Schematic diagram



Marking and pin assignment



XXXX—Wafer Lot No.
 YYYY—Quality Code



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP4407SR-G	-55°C to +150°C	SOP8	4000

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

parameter	symbol	limit	unit
Drain-source voltage	V_{DS}	-30	V
Gate-source voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	TC=25°C	-12
		TC=70°C	-9
Pulsed Drain Current	I_{DP}	-60	A
Avalanche energy(L=0.3mH)	E_{AS}	100	mJ
Power Dissipation	P_D	TC=25°C	3
		TC=70°C	2.1
Operating junction Temperature range	T_j	-55—150	°C

Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	μA
Gate-body leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 25V$	-	-	± 100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.00	-1.6	-3.0	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=-12A$	-	10	14	m Ω
		$V_{GS}=4.5V, I_D=-10A$		14	20	
Forward transconductance	gfs	$V_{GS}=-5V, I_D=-12A$	-	24	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{DS}=-15V, V_{GS}=0V$ $f=1.0MHz$	-	2310	2500	pF
Output capacitance	C_{OSS}		-	309	-	
Reverse transfer capacitance	C_{RSS}		-	270	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	$V_{DS}=-15V$ $R_L=2.2\Omega$ $V_{GS}=-10V$ $R_{GEN}=3\Omega$	-	11	-	ns
Rise time	t_r		-	9.4	-	
Turn-off delay time	$t_{D(OFF)}$		-	24	-	
Fall time	t_f		-	12	-	
Total gate charge	$Qg(10V)$	$V_{DS}=-15V, I_D=-12A$ $V_{GS}=-4.5V$	-	28	-	nC
Total gate charge	$Qg(4.5V)$			24		
Gate-source charge	Qgs		-	6.8	-	
Gate-drain charge	Qgd		-	9.8	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	$V_{GS}=0V, I_S=-1.0A$	-	-0.8	-1.0	V

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	33	40	°C/W
Maximum Junction-to-Ambient ^A		Steady-State	59	
Maximum Junction-to-Lead ^B	$R_{\theta JC}$	16	24	

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ C$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10s$ thermal resistance rating.

B: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

Typical Performance Characteristics

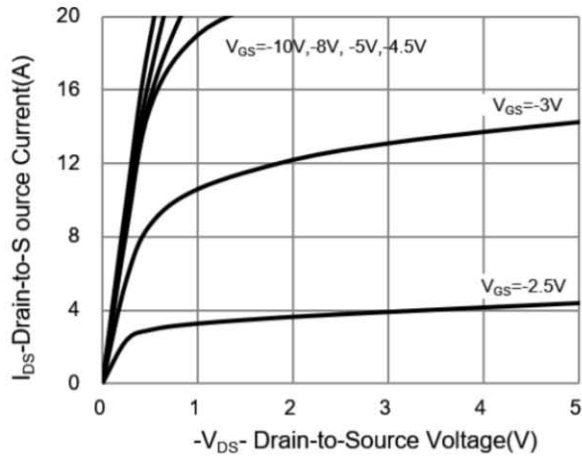


Fig 1: On-Region Characteristics

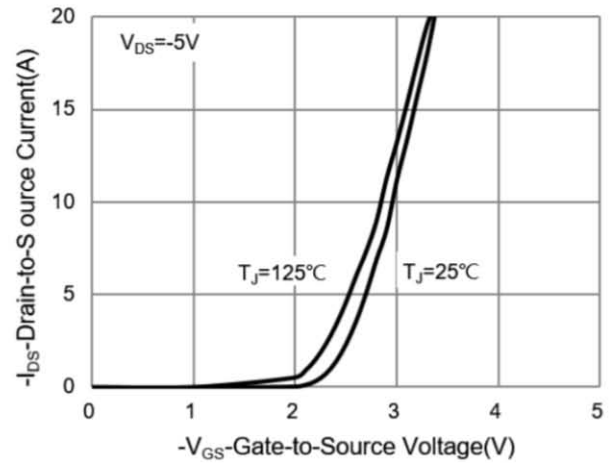


Figure 2: Transfer Characteristics

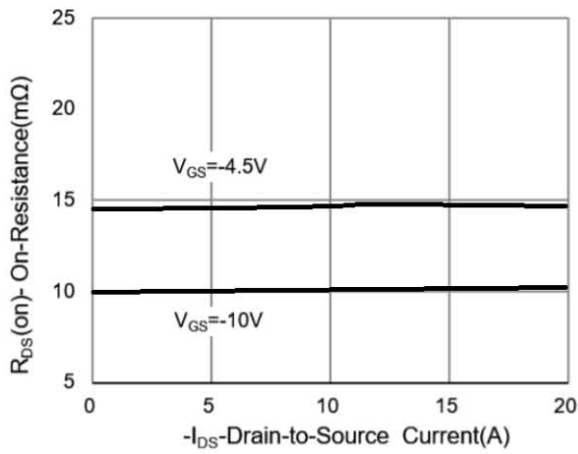


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

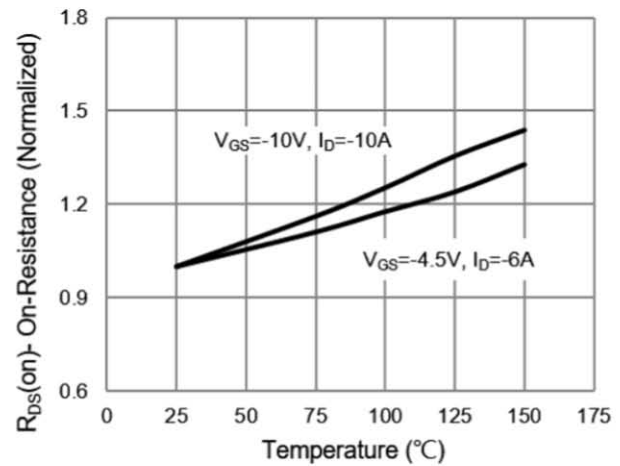


Figure 4: On-Resistance vs. Junction Temperature

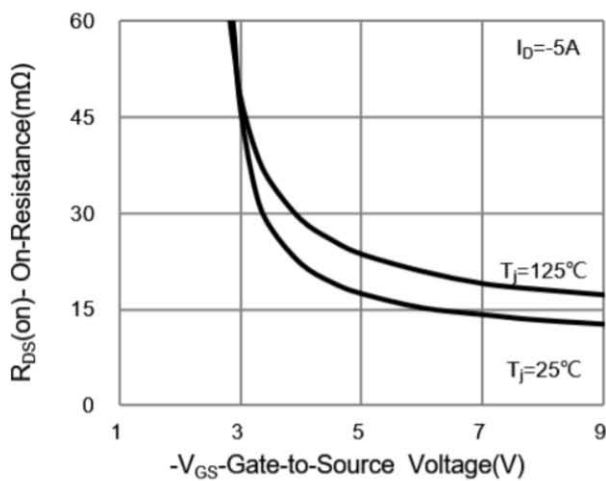


Figure 5: On-Resistance vs. Gate-Source Voltage

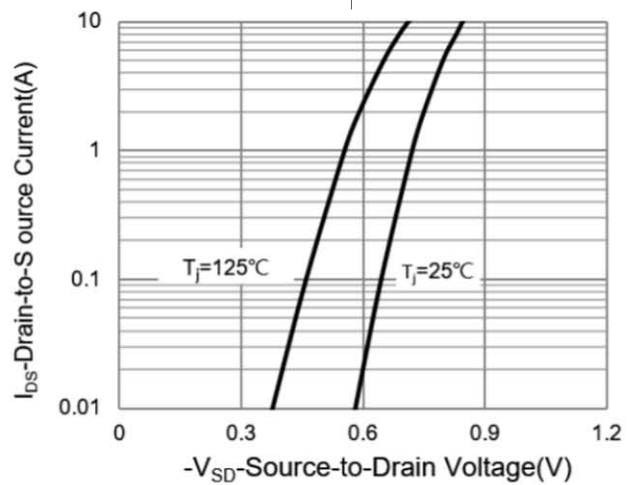
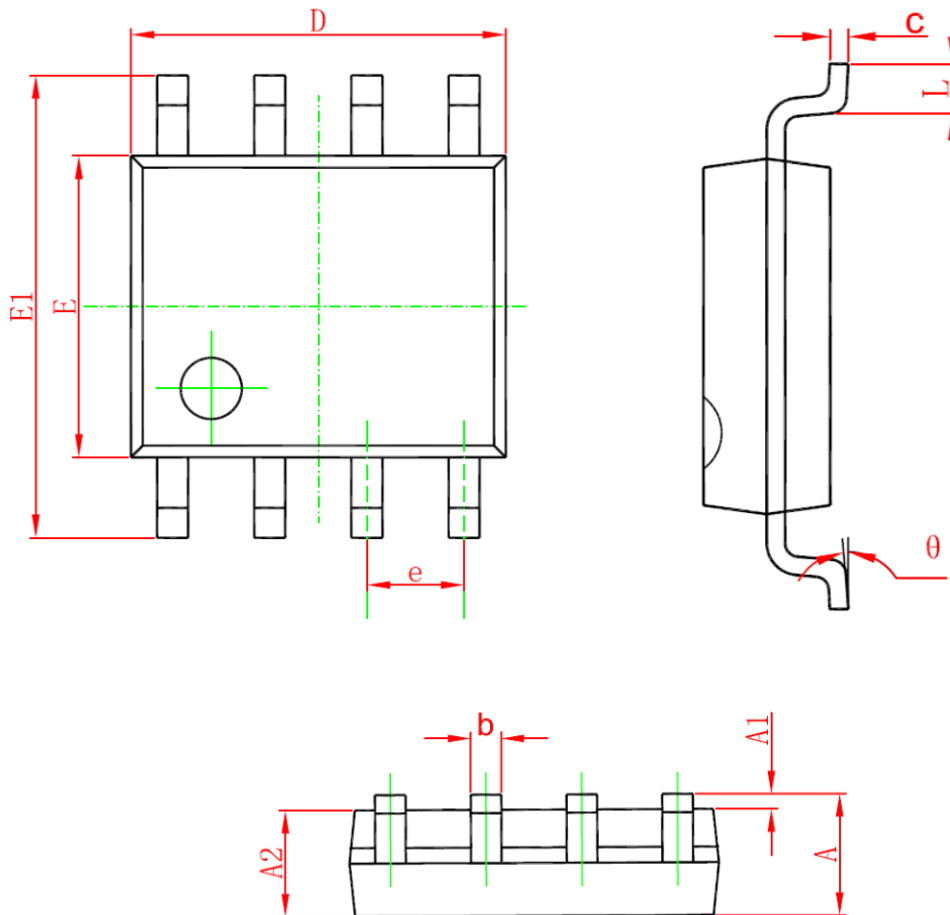


Figure 6: Body-Diode Characteristics

Package Information

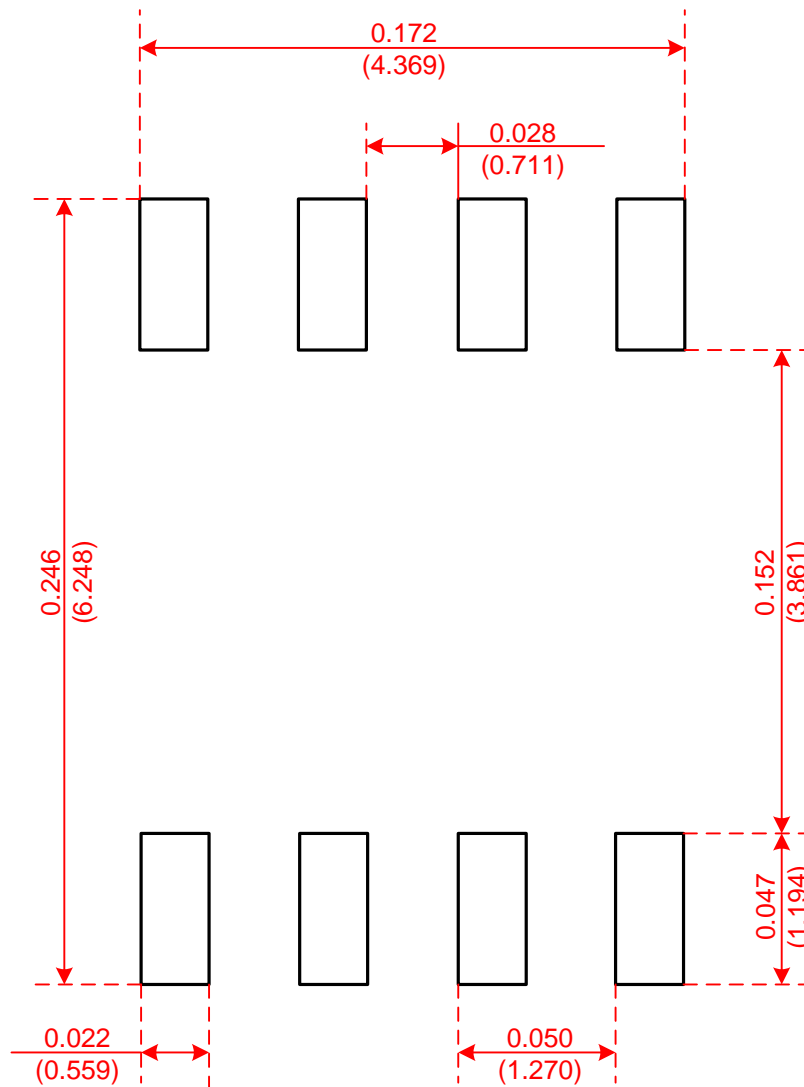
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Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Recommended Minimum Pads

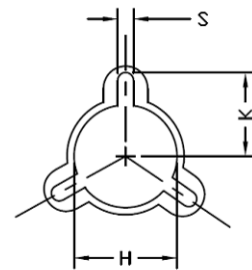
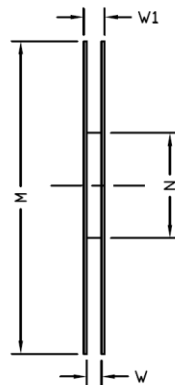
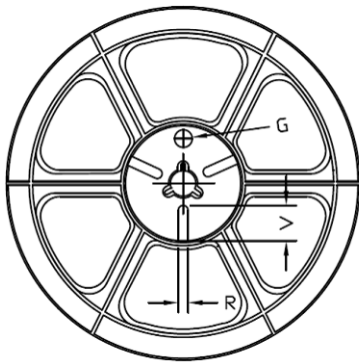
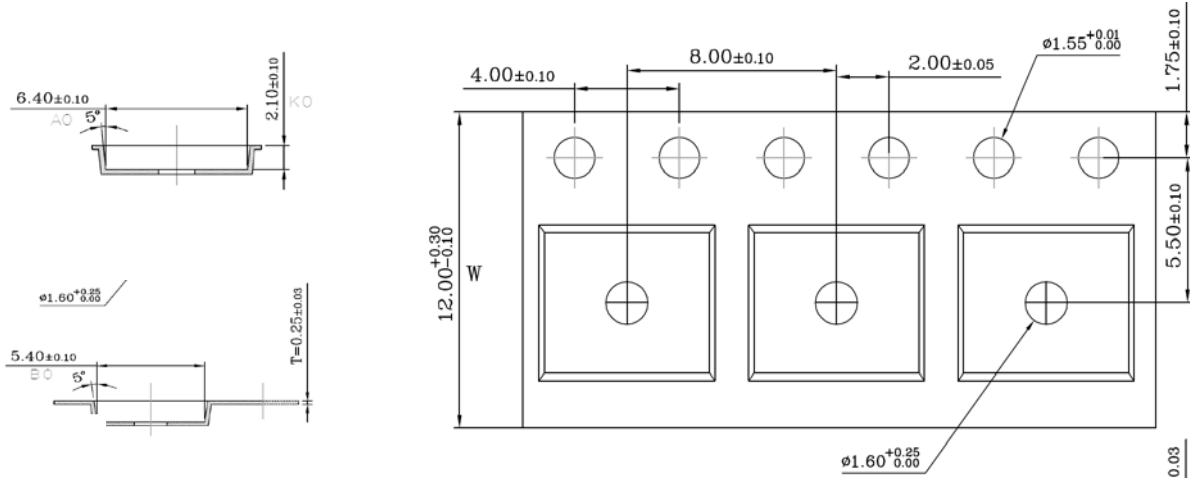
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Recommended Minimum Pads
Dimensions in Inches/(mm)

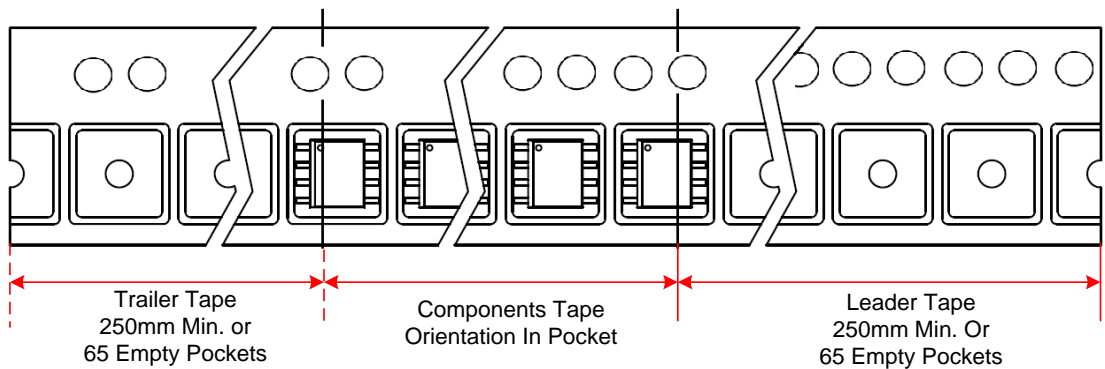
Tape and Reel

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Tape Size	Reel Size	M	N	W	W1	H	K	S	G	R	V
12mm	Φ330	Φ330.00 ±0.50	Φ97.00 ±0.30	13.00 ±0.30	17.40 ±1.00	Φ13.00 ±0.5	10.6	2.00 ±0.50	—	—	—

Unit Per Reel:
4000pcs



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