WinhiSemi

VUGA120N04TA

Datasheet

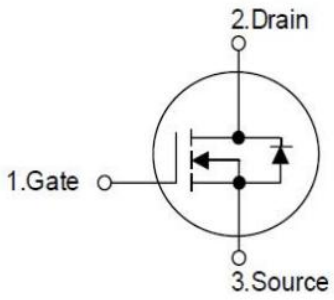
16mΩ, 30V, N-Channel Power MOSFET

VUGA120N04TA

General Description

VUGA120N04TA N-Channel MOSFET is based on unique device design to achieve low $RDS_{(ON)}$, low gate charge, fast switching and excellent avalanche characteristics.

Symbol

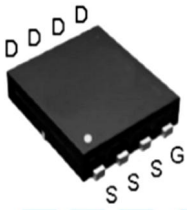


Symbol of VUGA120N04TA

Features

- Low RDS(ON) & FOM
- $R_{DS(ON)\_max}$ = 16mΩ@V_{GS} = 4.5V
- Extremely low switching loss
- Fast switching and soft recovery

Package Type



Package Type of VUGA120N04TA

Application

- Charging Circuit
- Battery Applications
- Synchronous Rectification
- High Frequency Switching

Ordering Information

Product Name	Package	Marking
VUGA120N04TA	PDFN3.3*3.3	120N04

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±8	V
Continuous Drain Current[Note 1], T_C=25ºC	I_D	22	A
Pulsed Drain Current[Note 2]	I_{DM}	66	A
Max Power Dissipation [Note 3], T_C=25ºC	P_D	19.4	W
Avalanche Current, Single Pulse [Note 5]	I_{AS}	36.02	A
Avalanche Energy, Single Pulse [Note 5]	E_{AS}	194.6	mJ
Operation Junction temperature	T_J	-55 to 150	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		6.45		ºC/W
Thermal Resistance, Junction-to-Ambient[Note4]	$R_{\theta JA}$		62		

Notes:

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) P_D is based on max. junction temperature, using junction-case thermal resistance.
4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with Ta=25 °C.
5) V_{DS}=15V,V_{GS}=4.5V, L=0.3mH, Rg=25Ω, starting T_J=25 °C.

Electrical Characteristics (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±8V, V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	0.4	0.6	0.9	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=5A		13.1	16	mΩ
		V_{GS}=4.5V, I_D=15A		13.2	16	mΩ
Gate Resistance	R_G	f=1MHz, open drain		0.51		Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V		441.8		pF
Output Capacitance	C_{oss}	V_{DS}=15V		395		pF
Reverse Transfer Capacitance	C_{rss}	f=1MHz		20.7		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=15V		6.8		ns
Rise Time	t_r	V_{GS}=4.5V		3.1		
Turn-off Delay Time	$t_{d(off)}$	I_D=6A		23.4		
Fall Time	t_f	R_G=3Ω		9.9		
Switching Characteristics						
Total Gate Charge (@VGS=8V)	Q_g	V_{GS}=0 to 8V		16.56		nC
Total Gate Charge (@VGS=4.5V)	Q_g	V_{DS}=10V		10.03		
Gate to Source Charge	Q_{gs}	I_D=15A		0.94		
Gate to Drain Charge	Q_{gd}			3.68		
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=12A		0.87	1.2	V
Reverse Recovery Time	t_{rr}	V_{DS}=10V		30.16		ns
Reverse Recovery Charge	Q_{rr}	I_F=12A		20.72		nC
Peak Reverse Recovery Current	I_{rrm}	di/dt=100A/us		1.26		A

Typical Performance Characteristics

Figure 1: Typ. Output Characteristics

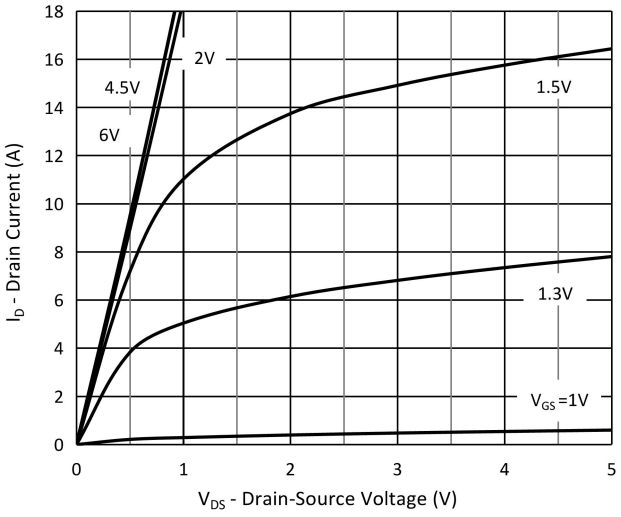


Figure 2: Typ. Transfer Characteristics

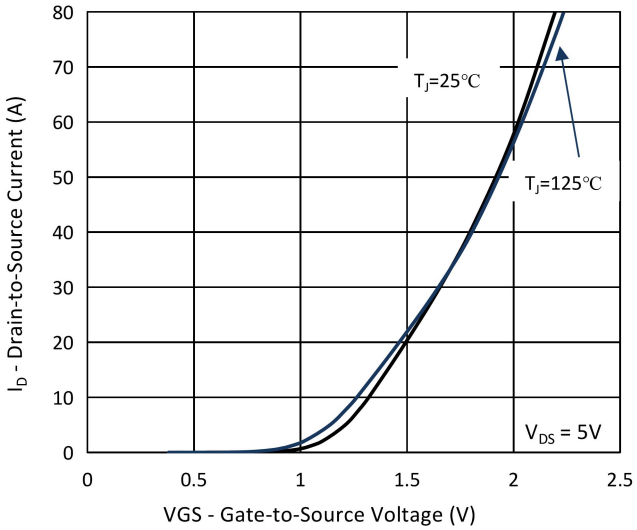


Figure 3: Drain-Source On-State Resistance

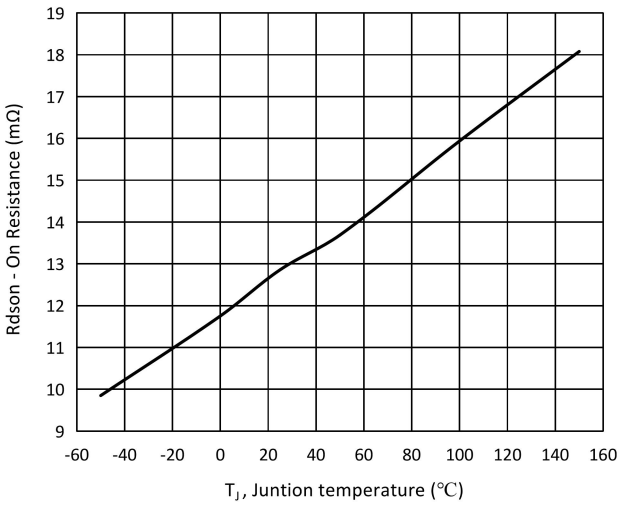


Figure 4: On-Resistance vs. Gate-source voltage

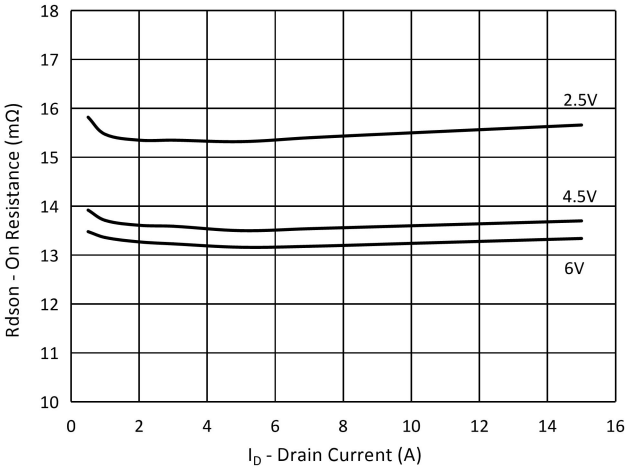


Figure 5: Typ. Capacitances

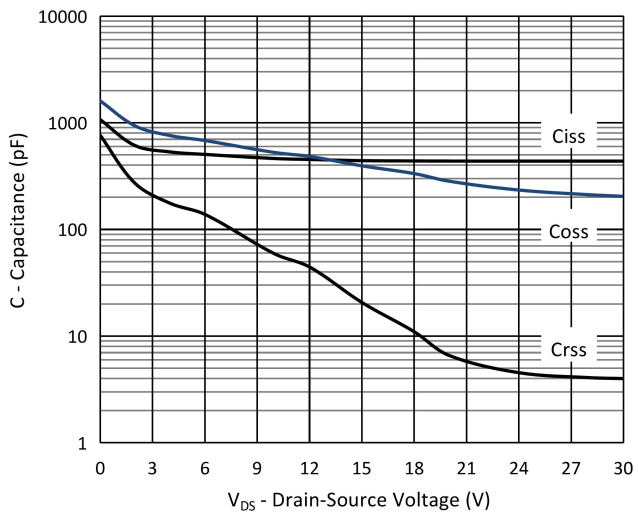


Figure 6: Gate Charge Characteristics

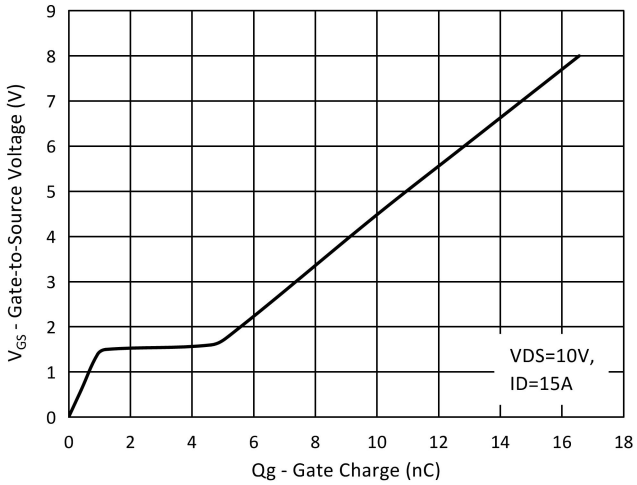


Figure 7: Forward Characteristics of Body Diode

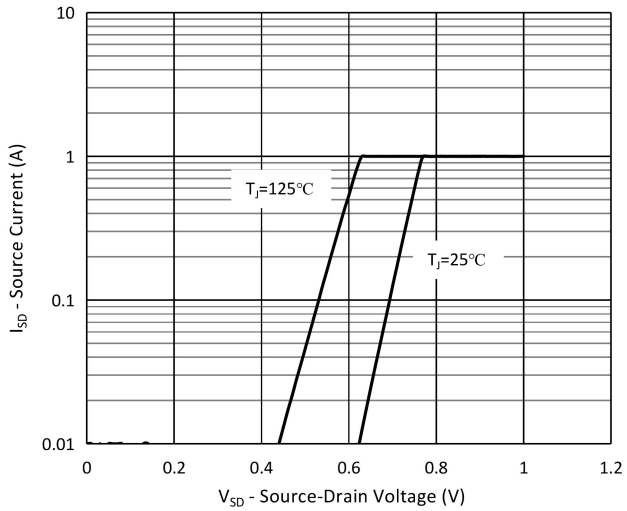


Figure 8: Safe Operating Area

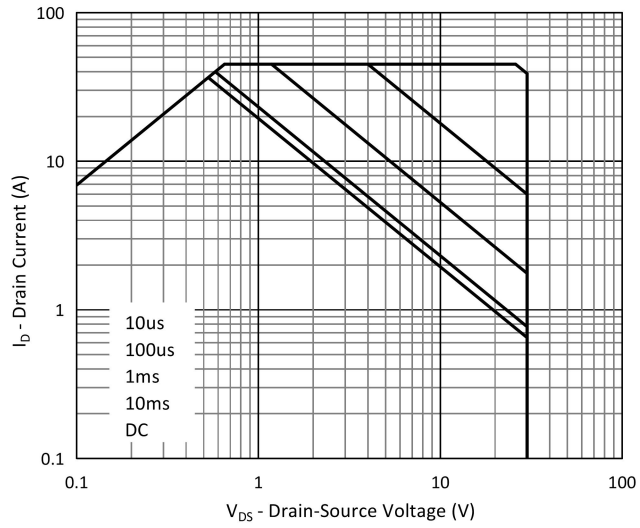


Figure 9: Power De-rating

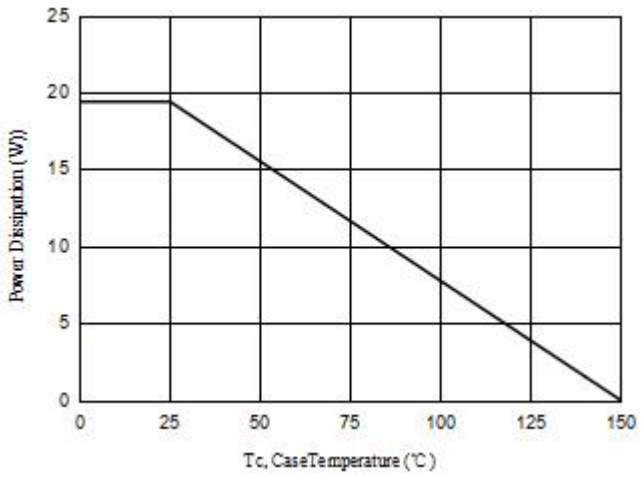


Figure 10: Current De-rating

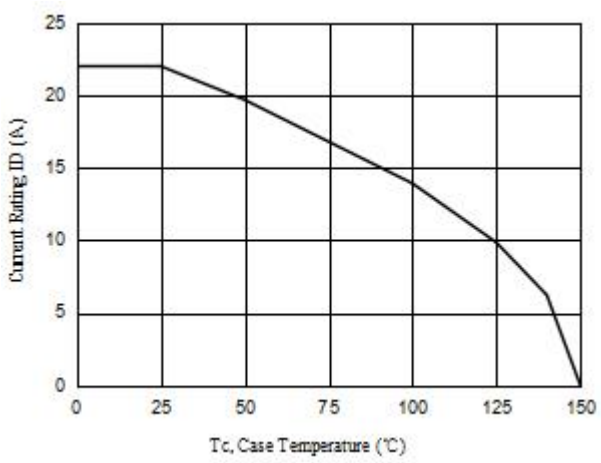


Figure 11: Single pulse power rating, Junction to case

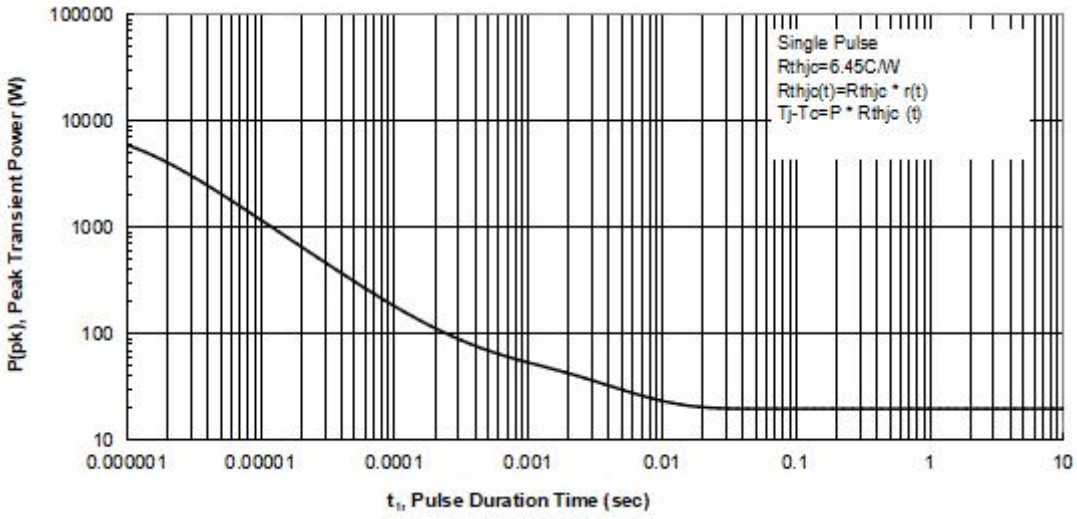
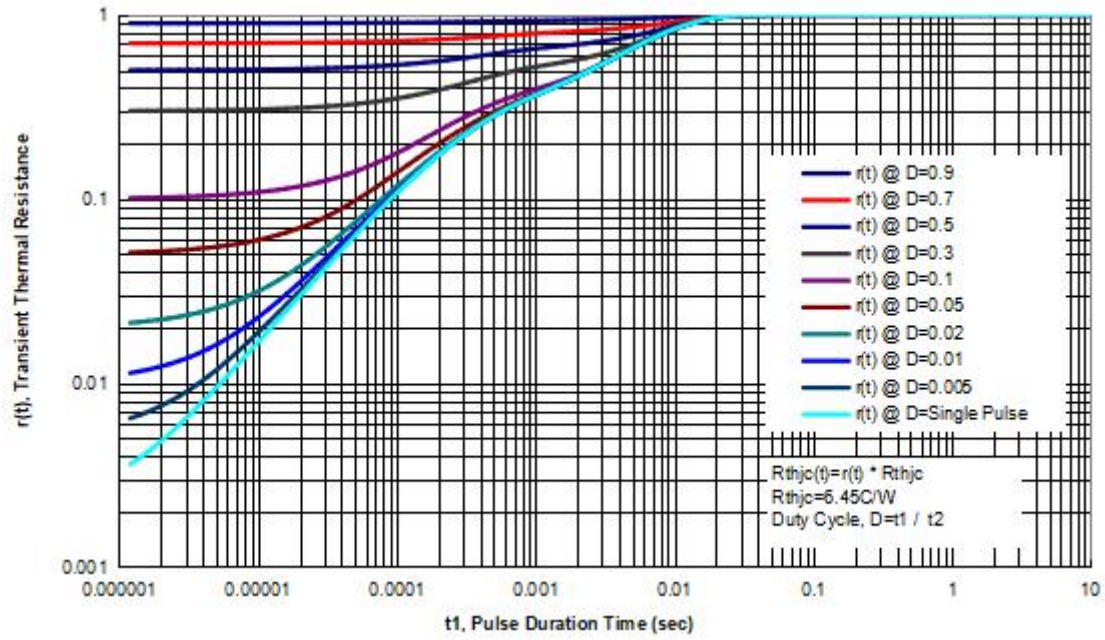
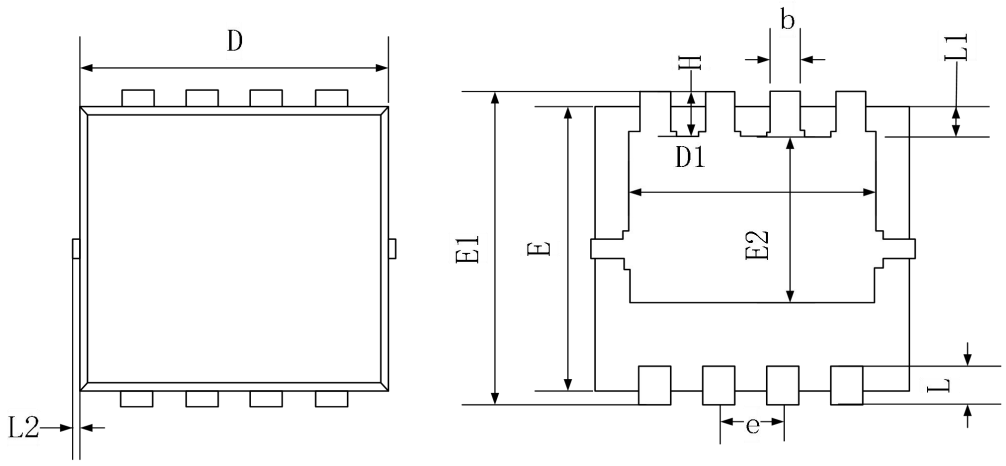
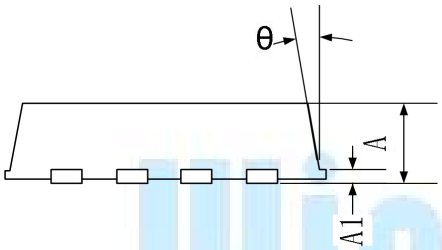


Figure 12: Max transient thermal impedance



Mechanical Dimensions (PDFN3.3*3.3 Unit:mm)





SYMBOL	MILLIMETERS	
	MIN	MAX
A	0.70	0.90
A1	0.10	0.25
D	2.90	3.25
D1	2.25	2.69
E	2.90	3.20
E1	3.00	3.60
E2	1.35	2.20
b	0.20	0.40
e	0.65BSC	
L	0.30	0.50
L1	0.13BSC	
L2	0.00	0.20
H	0.15	0.65
θ	0°	14°

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