



VMDSEMI

VUSC004R500PA

Datasheet

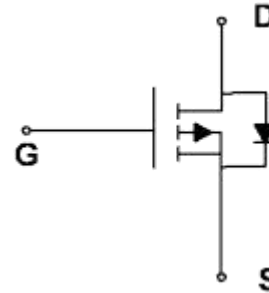


VMDSEMI

General Description

Symbol

$V_{(BR)DSS}$	$R_{DS(ON)_{max}}$	I_D
-40V	50mΩ@-10V	-5.6A
	60mΩ@-4.5V	



Symbol of VUSC004R500PA

Features

- Excellent package for good heat dissipation
- Advanced Trench technology
- Small Signal MOSFET

Application

- Power switching application
- Switched mode power supply
- DC-DC converter

Package Type



SOT23-3L

Package Type of VUSC004R500PA

Ordering Information

Product Name	Package
VUSC004R500PA	SOT23-3L

Absolute Maximum Ratings($T_A=25\text{ }^\circ\text{C}$, unless otherwise specified)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	-40	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current ^{Note 1}	$T_A=25\text{ }^\circ\text{C}$	I_D	-5.6	A
Pulsed Drain Current ^{Note 2}	$T_A=25\text{ }^\circ\text{C}$	I_{DM}	-22.4	A
Max Power Dissipation ^{Note 3}	$T_A=25\text{ }^\circ\text{C}$	P_D	1.2	W
Avalanche Energy, Single Pulse ^{Note 4}		E_{AS}	29	mJ
Operation Junction temperature		T_J, T_{SGT}	-55 to 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Lead	$R_{\theta JC}$	-	49.5	-	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient ^{Note 5}	$R_{\theta JA}$	-	100.5	-	$^\circ\text{C}/\text{W}$

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) $V_{DS} = -25\text{V}, V_{GS} = -10\text{V}, L = 0.1\text{mH}$, starting $T_J = 25\text{ }^\circ\text{C}$.
- 5) The value of $R_{\theta JA}$ is measured with the device mounted on 1 inch 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25\text{ }^\circ\text{C}$.

Electrical Characteristics($T_A=25\text{ }^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-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-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.7	-2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-5.6A$	-	36.7	50	mΩ
		$V_{GS}=-4.5V, I_D=-3A$	-	44.8	60	
Gate Resistance	R_G	f=1MHz, Open Drain	-	5	-	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{GS}=0V$	-	934	-	pF
Output Capacitance	C_{oss}	$V_{DS}=-20V$	-	76	-	pF
Reverse Transfer Capacitance	C_{rss}	f=1MHz	-	68	-	pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-20V$	-	6.6	-	ns
Rise Time	t_r	$V_{GS}=-10V$	-	26	-	
Turn-off Delay Time	$t_{d(off)}$	$I_D=-5.6A$	-	29	-	
Fall Time	t_f	$R_G=3\Omega$	-	35	-	
Gate Charge Characteristics						
Total Gate Charge	Q_g	$V_{GS}=-10V$	-	20	-	nC
Gate to Source Charge	Q_{gs}	$V_{DS}=-20V$	-	4.5	-	
Gate to Drain Charge	Q_{gd}	$I_D=-5.6A$	-	3	-	
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-5.6A$	-	-0.86	-1.2	V

Typical Performance Characteristics

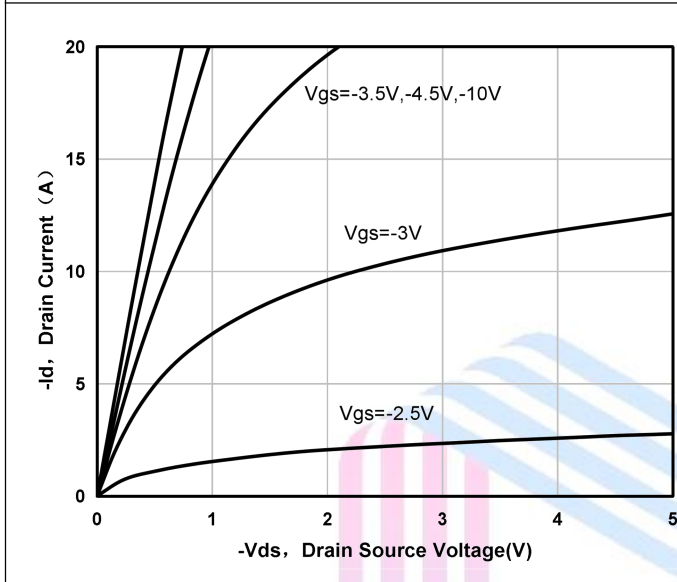
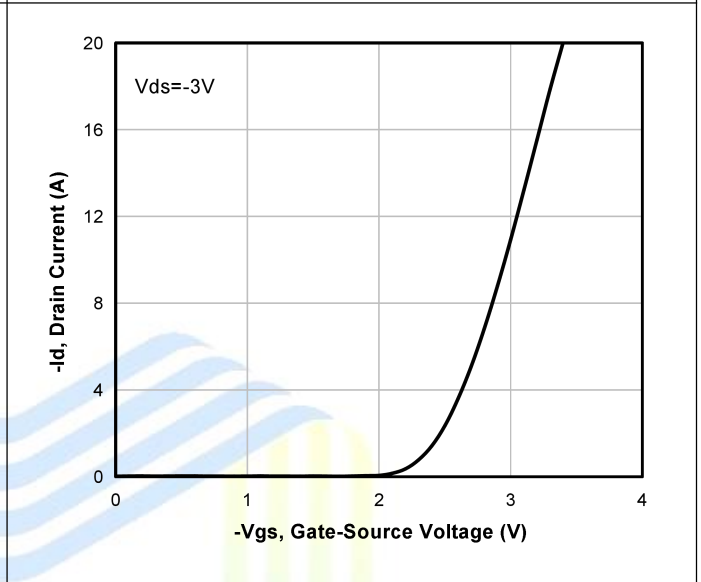
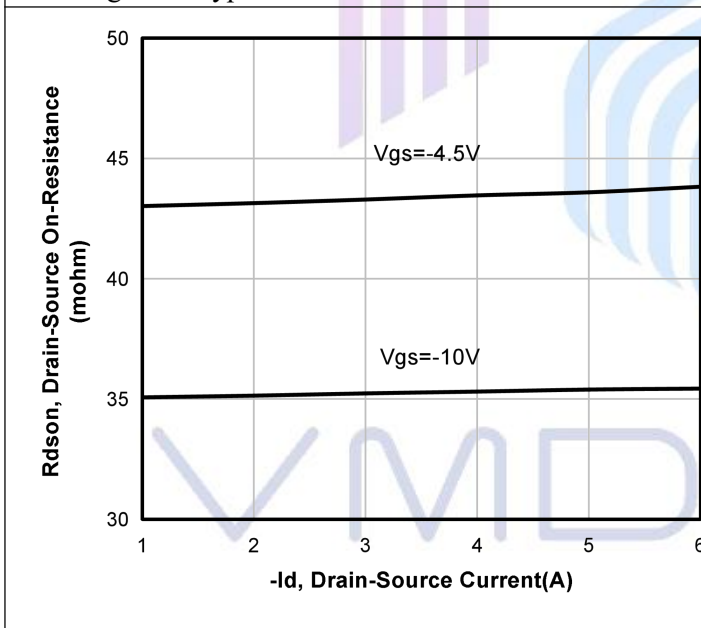
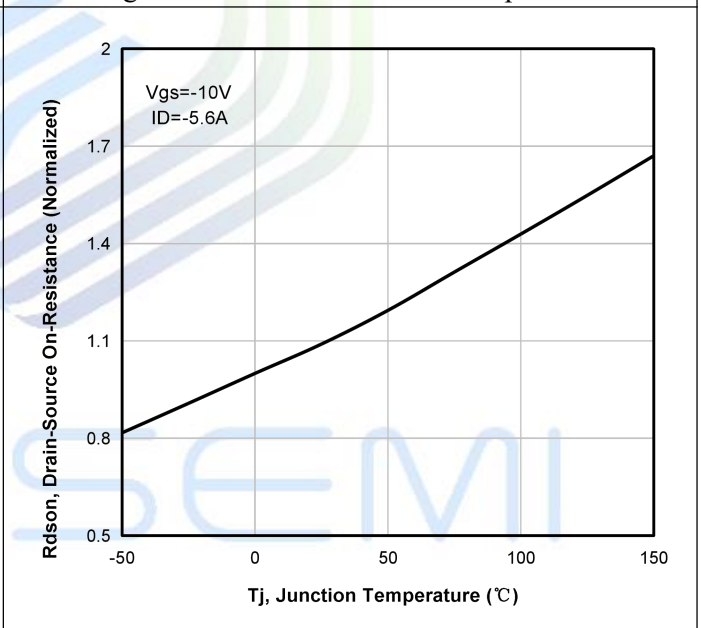
Figure 1: Typ. Output Characteristics

Figure 2: Typ. Transfer Characteristics

Figure 3: Typ. On-Resistance vs. Drain Current

Figure 4: On-Resistance vs. Temperature


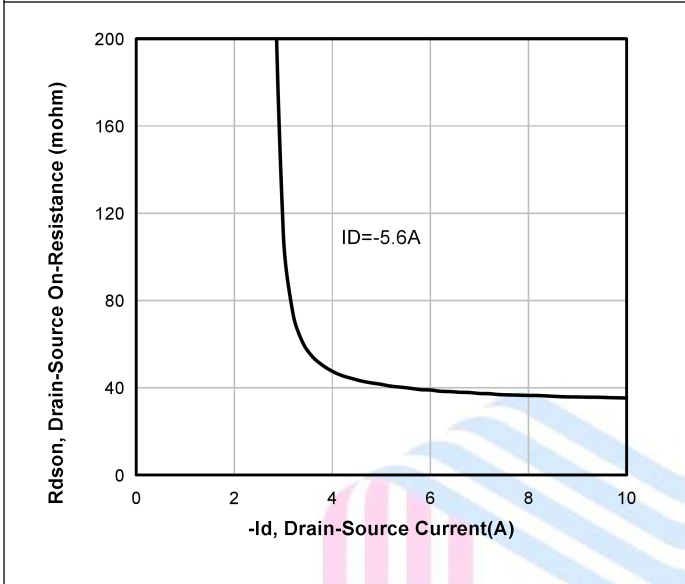
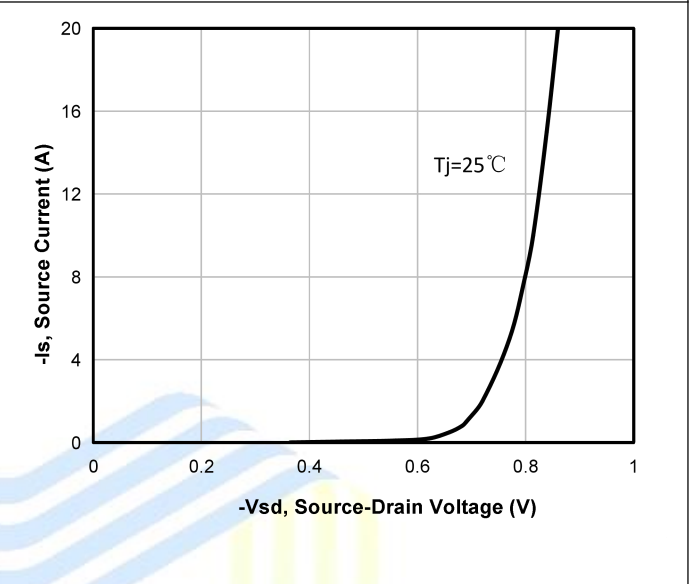
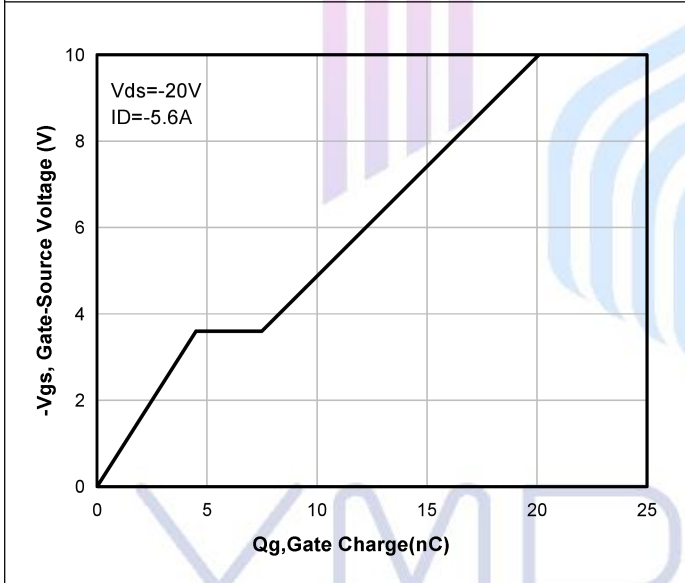
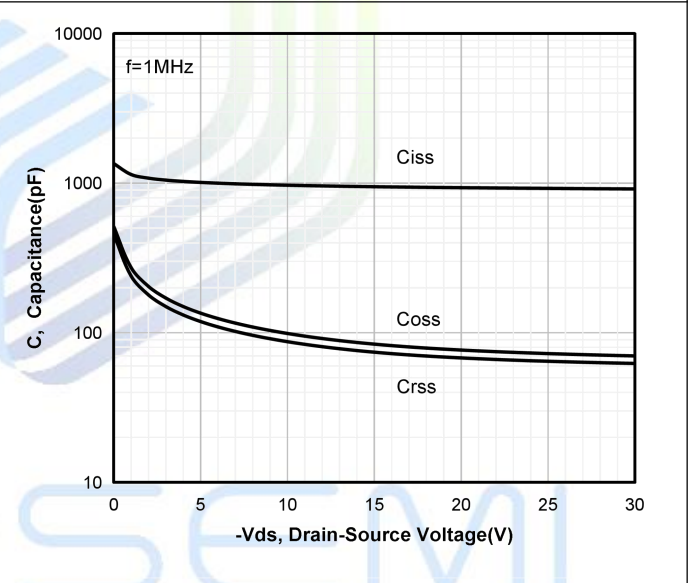
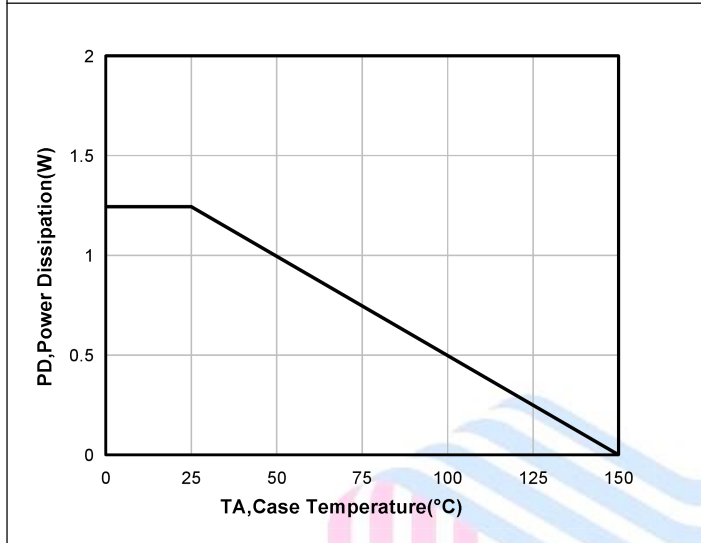
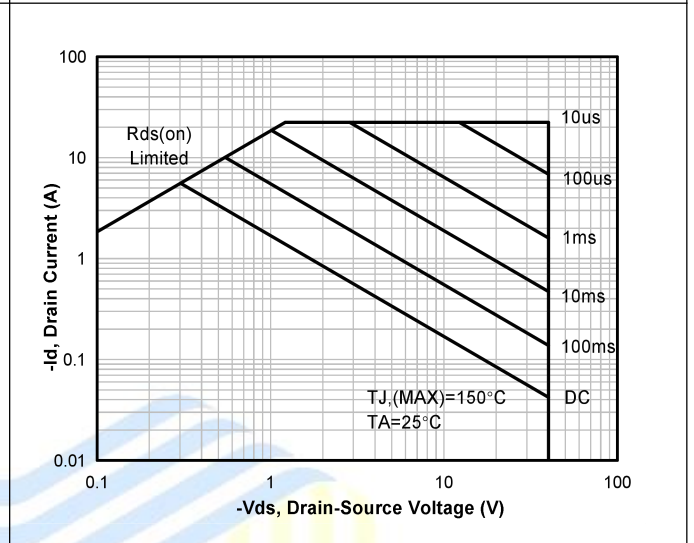
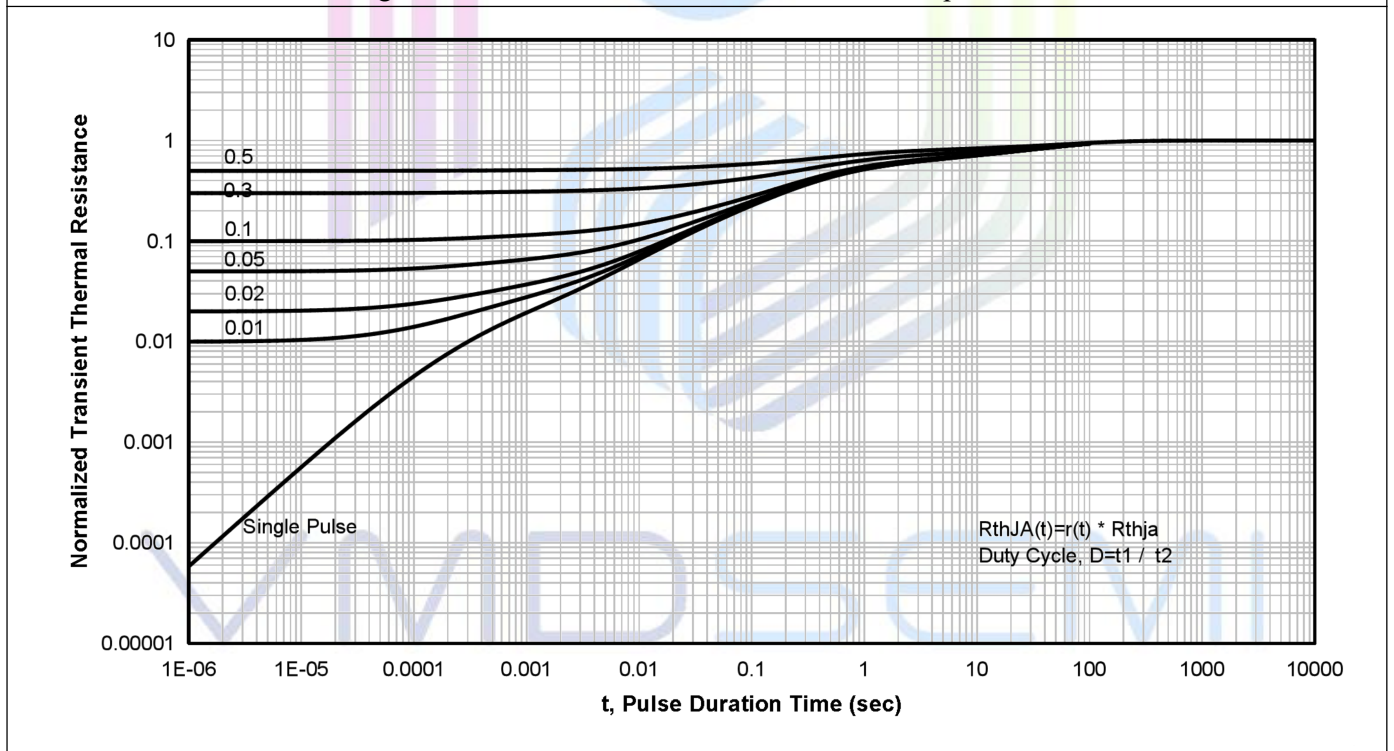
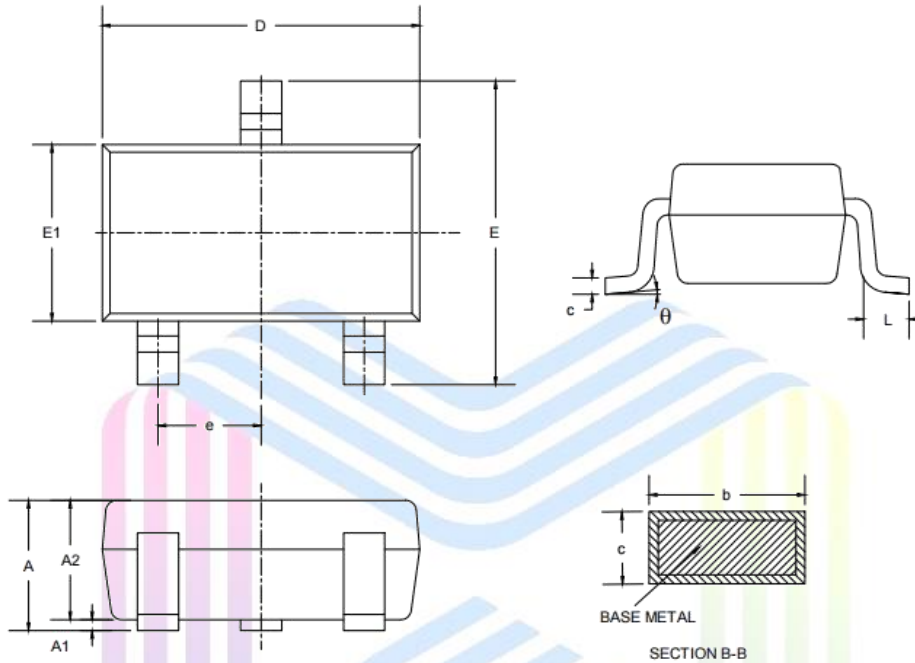
Figure 5: On-Resistance vs. Gate-Source Voltage

Figure 6: Forward Characteristics of Body Diode

Figure 7: Gate Charge Characteristics

Figure 8: Typ. Capacitances


Figure 9: Power Dissipation

Figure 10: Safe Operating Area

Figure 11: Normalized Max Transient Thermal Impedance


Mechanical Dimensions

SOT23-3L Package Information



SYMBOL	MILLIMETERS	
	MIN	MAX
A	0.9	1.45
A1	0	0.15
A2	0.9	1.3
b	0.28	0.5
c	0.1	0.23
D	2.82	3.05
E	2.6	3
E1	1.5	1.75
e	0.95BSC	
L	0.3	0.6
θ	0°	8°

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VMDSEMI



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