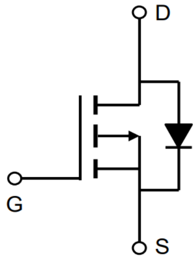
VSMT056P03VA1

-30V P-Channel Enhancement Mode MOSFET

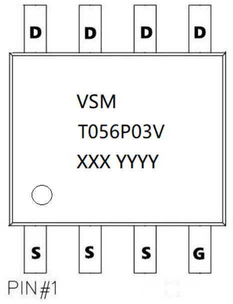
General Features

V_{DS}	I_D	$R_{DS(ON)}$ Type @ V_{GS}= -10V	$R_{DS(ON)}$ Type @ V_{GS}= -4.5V
- 30V	- 20A	5.6 mΩ	8.0mΩ



Description

The VSMT056P03VA1 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

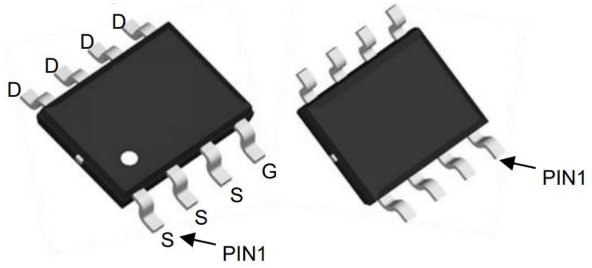


Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
VSMT056P03VA1	SOP-8L	VSM T056P03V XXX YYYY	3000

Absolute Maximum Ratings (TC=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	-30	V
VGS	Gate-Source Voltage	±20	V
ID@TC=25℃	Continuous Drain Current, VGS @ -10V1	-20	A
ID@TC=100℃	Continuous Drain Current, VGS @ -10V1	-16.8	A
IDM	Pulsed Drain Current2	-60	A
EAS	Single Pulse Avalanche Energy3	125	mJ
PD@TC=25℃	Total Power Dissipation4	69	W
TSTG	Storage Temperature Range	-55 to 150	℃
TJ	Operating Junction Temperature Range	-55 to 150	℃
RθJA	Thermal Resistance Junction-Ambient 1	85	℃/W
RθJC	Thermal Resistance Junction-Case1	1.6	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	-34	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.0232	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance	V_{GS}=-10V , I_D=-20A	---	5.6	7.2	mΩ
		V_{GS}=-4.5V , I_D=-15A	---	8.0	11	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.6	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.6	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-24V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-24V , V_{GS}=0V , T_J=55℃	---	---	-5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-30A	---	30	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	9.8	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-15V , V_{GS}=-4.5V I_D=-20A	---	35	---	nC
Q_{gs}	Gate-Source Charge		---	9.9	---	
Q_{gd}	Gate-Drain Charge		---	10.5	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=3.0Ω I_D=-20A	---	10.8	---	ns
T_r	Rise Time		---	13.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	73	---	
T_f	Fall Time		---	35	---	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	3520	---	pF
C_{oss}	Output Capacitance		---	465	---	
C_{rss}	Reverse Transfer Capacitance		---	370	---	
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-70	A
I_{SM}	Pulsed Source Current		---	---	-130	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.3	V
t_{rr}	Reverse Recovery Time	I_F=-20A , dI/dt=100A/μs , T_J=25℃	---	25	---	nS
Q_{rr}	Reverse Recovery Charge		---	10	---	nC

Note :

1、The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.

2、The data tested by pulsed , pulse width .The EAS data shows Max. rating .

3、The power dissipation is limited by 175℃ junction temperature

4、EAS condition: TJ=25℃, VDD= -24V, VG= -10V, RG=7Ω, L=0.1mH, IAS= -40A

5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Typical Characteristics

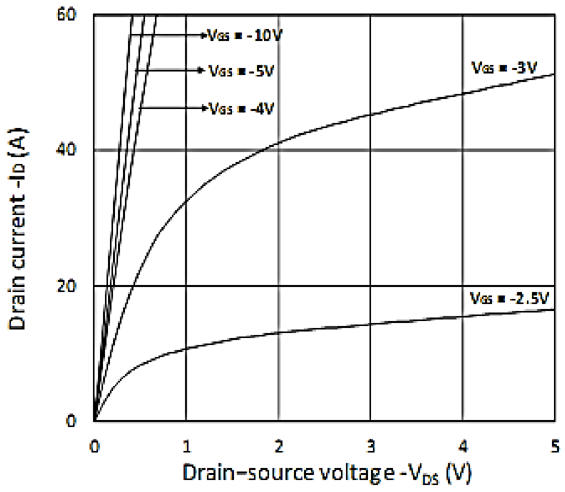


Figure 1. Output Characteristics

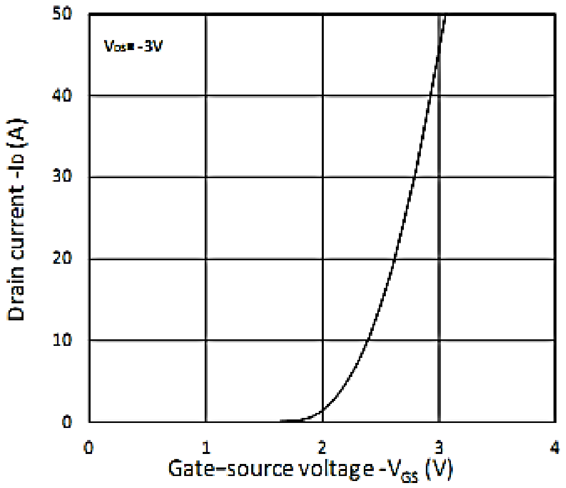


Figure 2. Transfer Characteristics

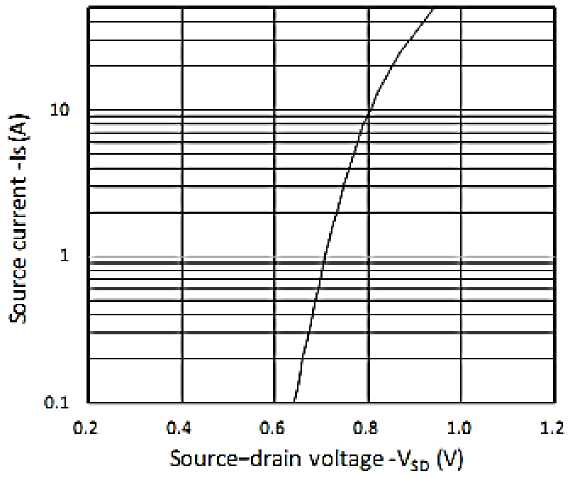


Figure 3. Forward Characteristics of Reverse

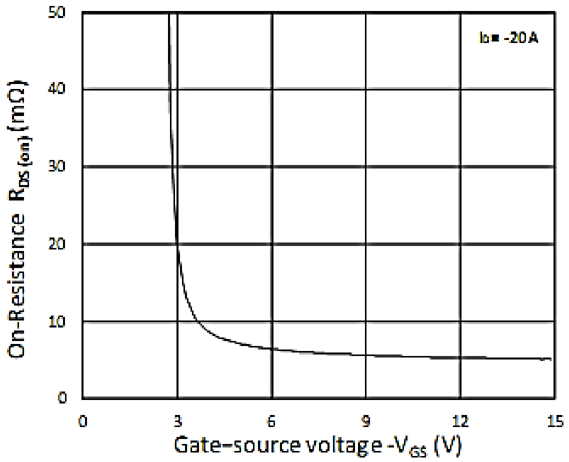


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

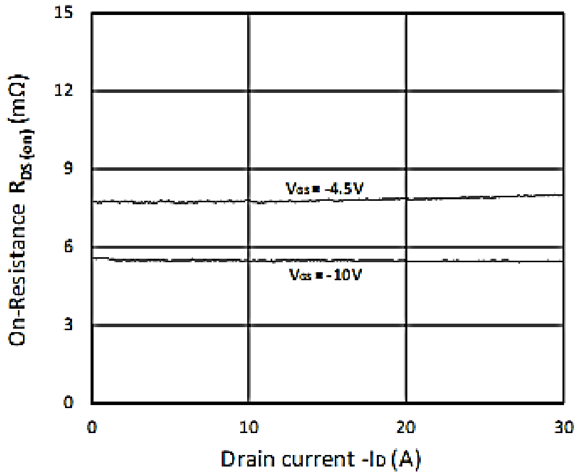


Figure 5. $R_{DS(ON)}$ vs. I_D

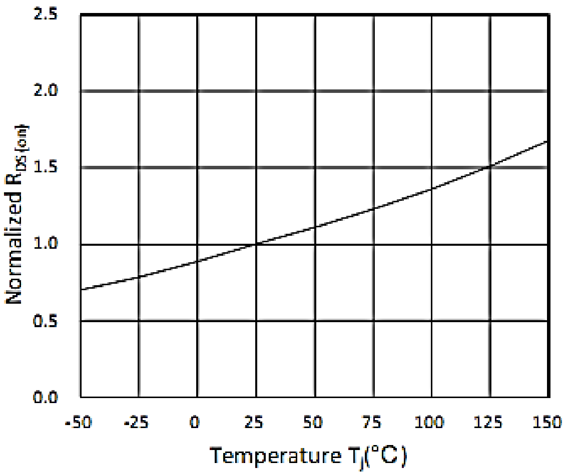


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

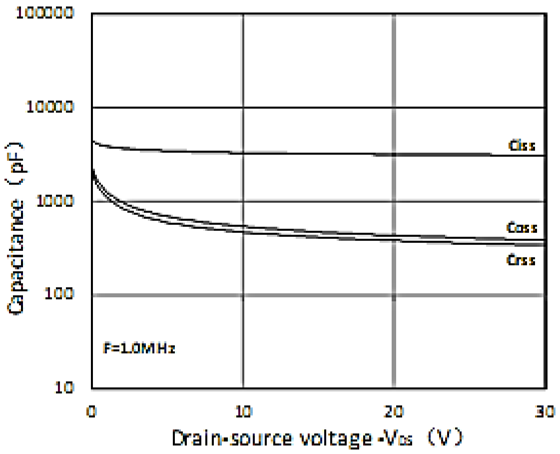


Figure 7. Capacitance Characteristics

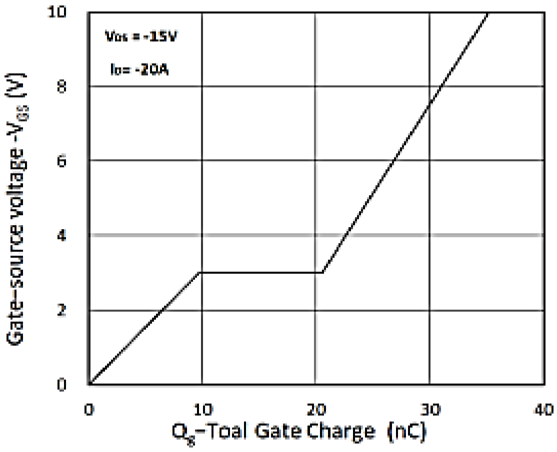


Figure 8. Gate Charge Characteristics

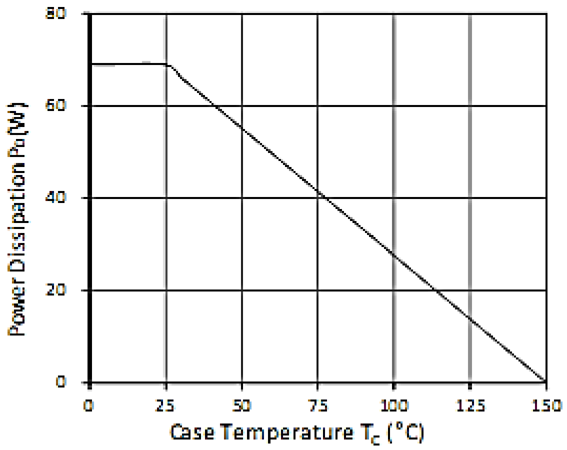


Figure 9. Power Dissipation

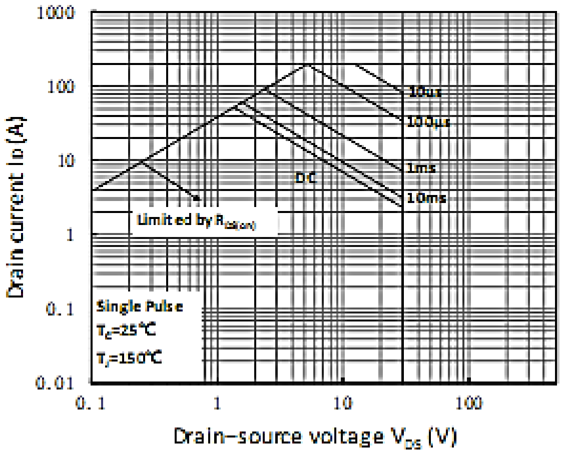


Figure 10. Safe Operating Area

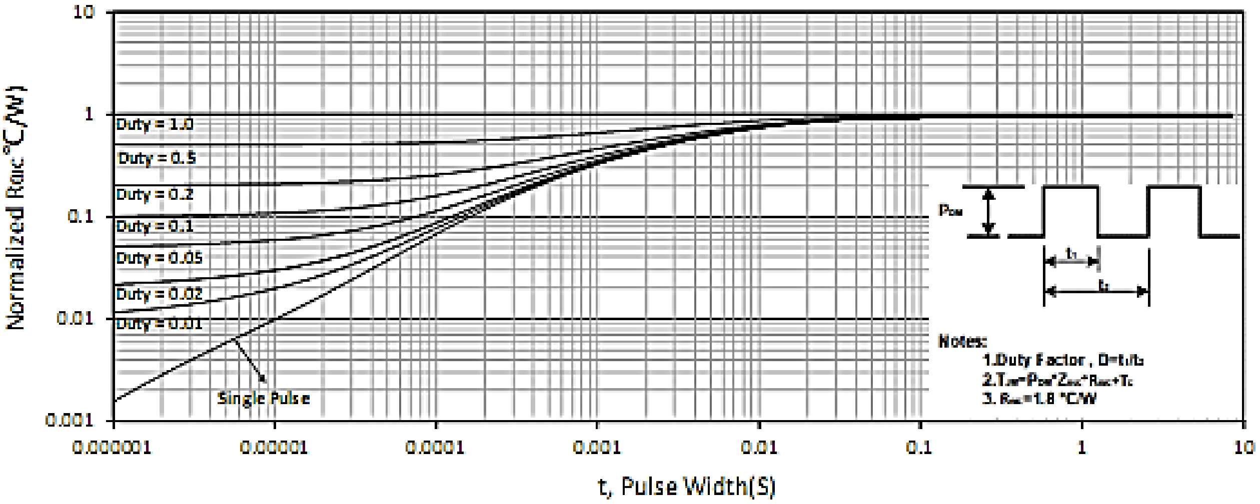
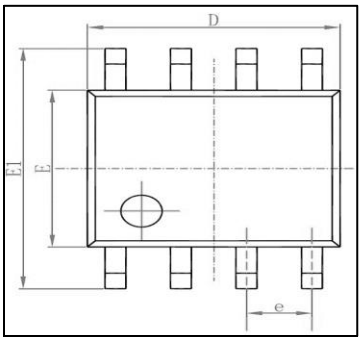
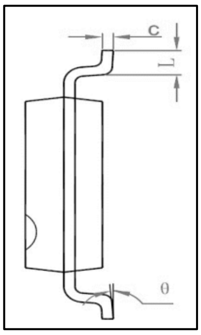
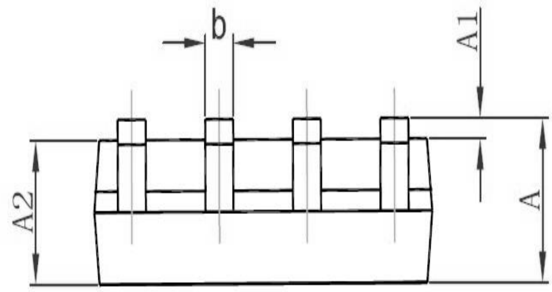


Figure 11. Normalized Maximum Transient Thermal Impedance

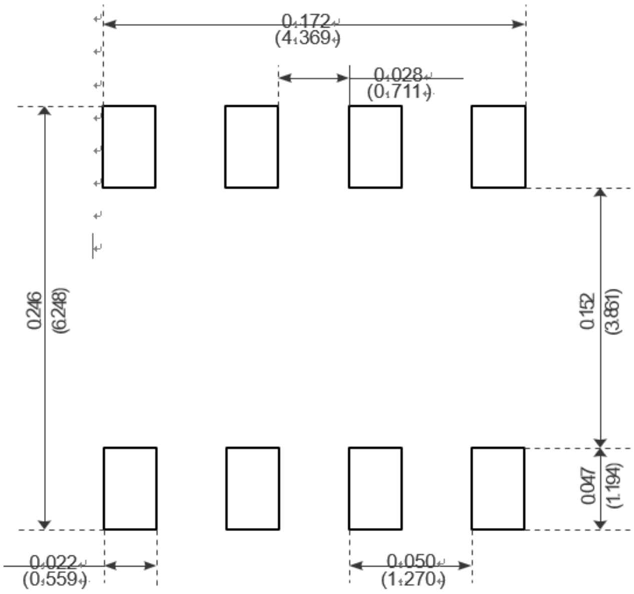
Package Mechanical Data-SOP-8L







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