



VMDSEMI

VSXX065R18ANA

Datasheet



VMDSEMI

General Description

Symbol

$V_{(BR)DSS}$	$R_{DS(ON)_{max}}$	I_D
650V	180mΩ@10V	21.2A

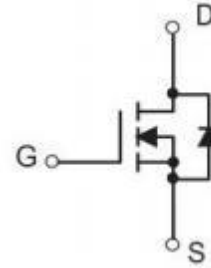


Figure 1 Symbol of VSXX065R18ANA

Features

- Ultra Low Gate Charge
- Ultra Low $R_{DS(ON)}$
- Fast switching capability
- Robust design with better EAS performance
- EMI Improved

Application

- UPS, Inverter, etc
- Solar
- TV Power
- High Power AC/DC Power Supply

Package Type

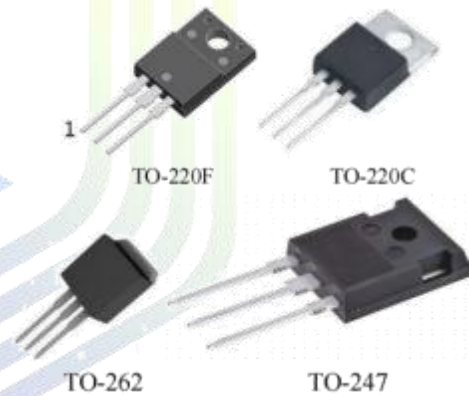


Figure 2 Package Type of VSXX065R18ANA

Ordering Information

Product Name	Package
VSTD065R18AND	TO-220F
VSTA065R18AND	TO-220C
VSTN065R18AND	TO-262
VSTF065R18AND	TO-247

Absolute Maximum Ratings^{Note1}

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	650	V
Gate-Source Voltage	V_{GSS}	±30	V
Continuous Drain Current $T_C=25\text{ }^\circ\text{C}$	I_D	21.2	A
Continuous Drain Current $T_C=100\text{ }^\circ\text{C}$		9.5	
Pulsed Drain Current ^{Note2}	I_{DM}	64	
Continuous diode forward current	I_S	21.2	
Diode pulsed current	$I_{S,PULSE}$	64	
Single Pulsed Avalanche Energy ^{Note3}	E_{AS}	505	mJ
Avalanche Energy, Repetitive ^{Note2}	E_{AR}	0.7	
Avalanche Current, Repetitive ^{Note2}	I_{AR}	3.6	A
MOSFET dv/dt Ruggedness, $V_{DS}\leq 480\text{V}$	dv/dt	50	V/ns
Reverse Diode dv/dt, $V_{DS}\leq 480\text{V}$, $I_{SD}\leq I_D$	dv/dt	15	V/ns
Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-55 to 150	
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	

Note:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. $I_{AS}=3.6\text{A}$, $V_{DD}=60\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$



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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=30V, V_{DS}=0V$			0.1	μA
		$V_{GS}=-30V, V_{DS}=0V$			-1.0	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.4	3.4	4.4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$		160	180	$m\Omega$
Gate Resistance	R_g	$f=1MHz, \text{Open drain}$		1.7		Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=50V$		1630		pF
Output Capacitance	C_{oss}	$V_{GS}=0V$		110		pF
Reverse Transfer Capacitance	C_{rSS}	$f=1MHz$		22		pF
Effective output capacitance, energy related ^{NOTE4}	$C_{O(er)}$	$V_{GS}=0V$		71		nF
Effective output capacitance, time related ^{NOTE5}	$C_{O(tr)}$	$V_{DS}=0\text{.....}480V$		301		
Total Gate Charge	Q_g	$V_{DS}=480V$ $V_{GS}=0 \text{ to } 10V$ $I_D=10A$		10.6		nC
Gate-Source Charge	Q_{gs}			12.2		
Gate-Drain Charge	Q_{gd}			38		
Gate Plateau Voltage	$V_{plateau}$			5.5		V
Switching Parameters						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=400V$		11		ns
Turn-on Rise Time	t_r	$V_{GS}=10V$		10		
Turn-off Delay Time	$t_{d(off)}$	$I_D=10A$		76		
Turn-off Fall Time	t_f	$R_G=3.4\Omega$		8		
Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=10A$		0.83	1.1	V
Reverse Recovery Time	t_{rr}	$I_S=10A$		330		ns
Reverse Recovery Charge	Q_{rr}	$V_R=400V$		4.5		nC
Peak Reverse Recovery Current	I_{rrm}	$di/dt=100A/us$		27		A

Note:

- $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 480V
- $C_{O(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 480 V

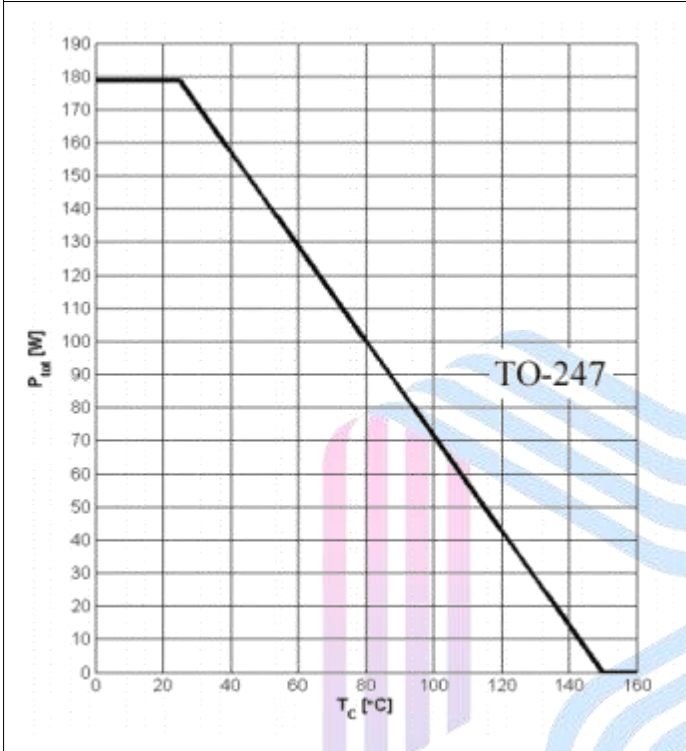
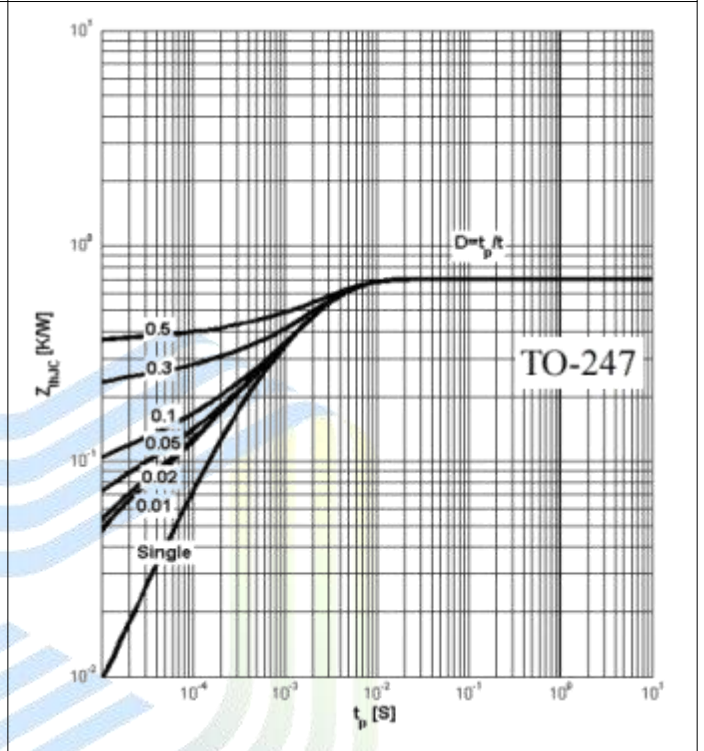
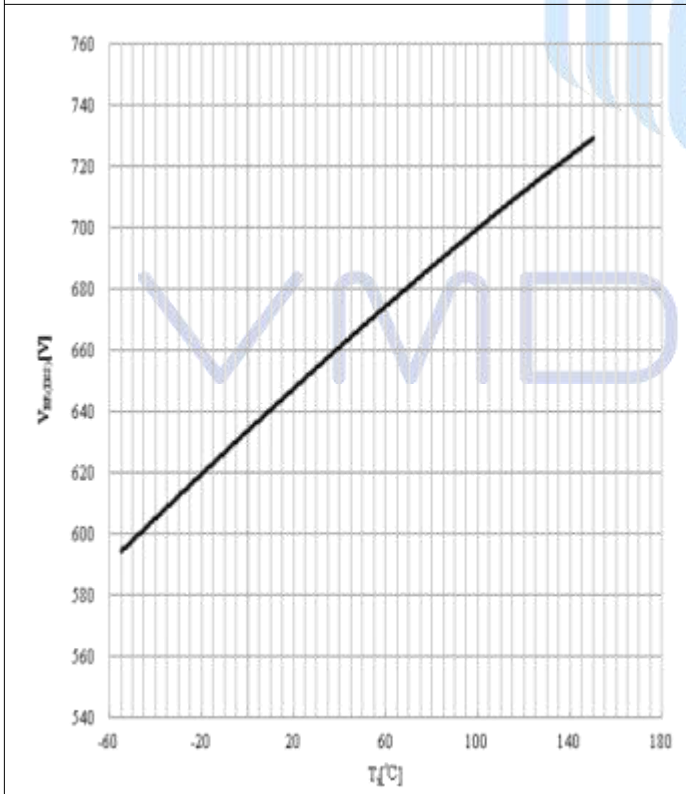
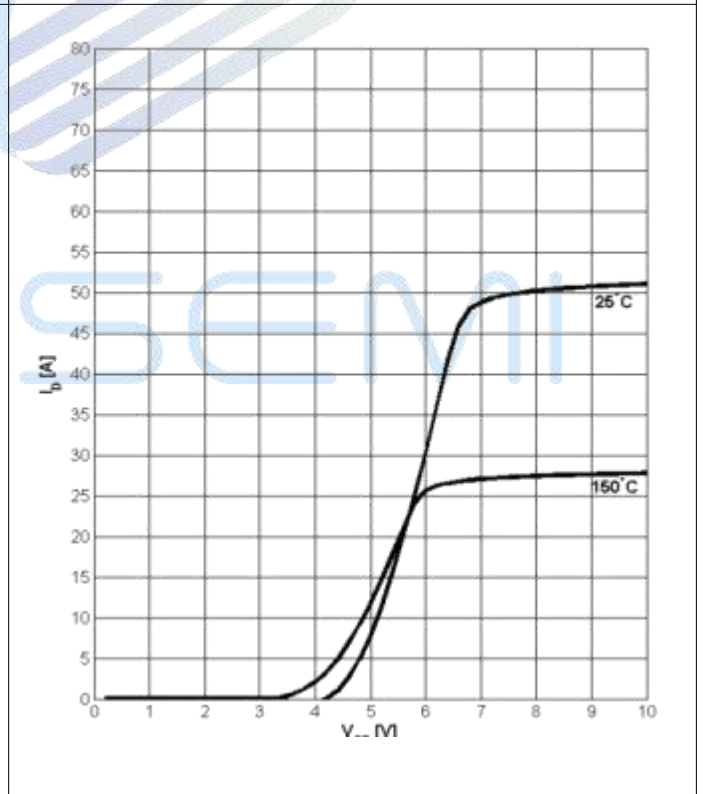
Typical Performance Characteristics
Figure 3: Power Dissipation

Figure 4: Max Transient Thermal Impedance

Figure 5: Drain-Source Breakdown Voltage

Figure 6: Typ Transfer Characteristics


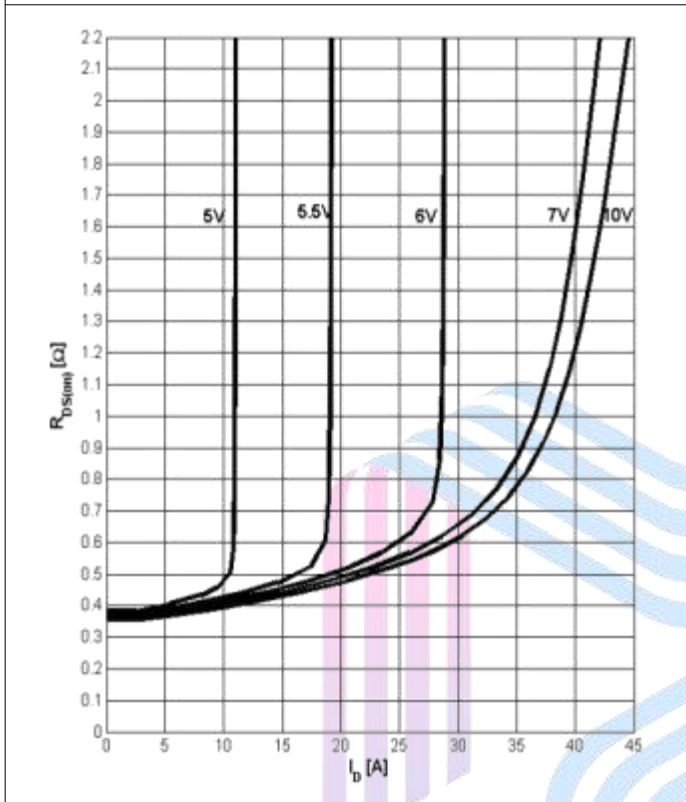
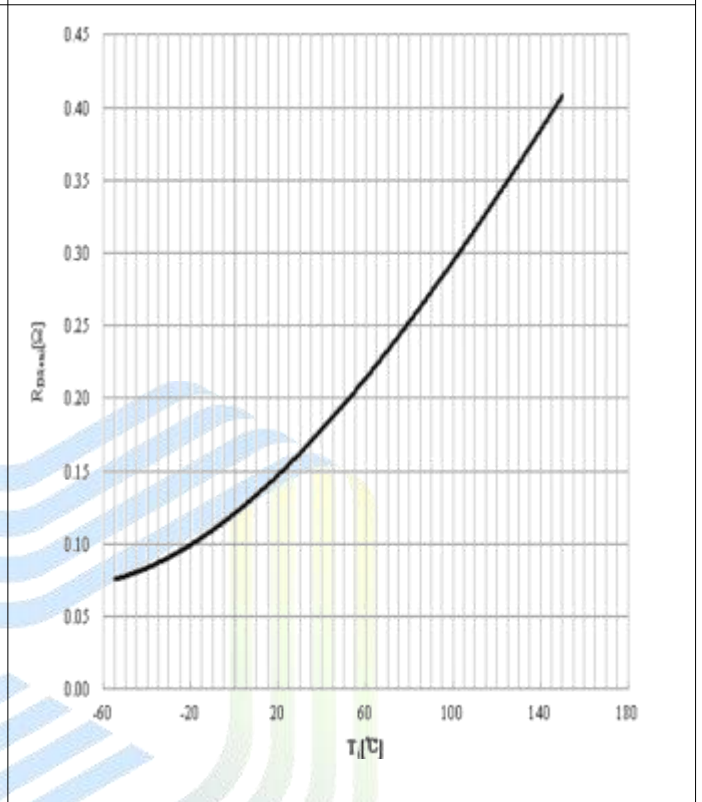
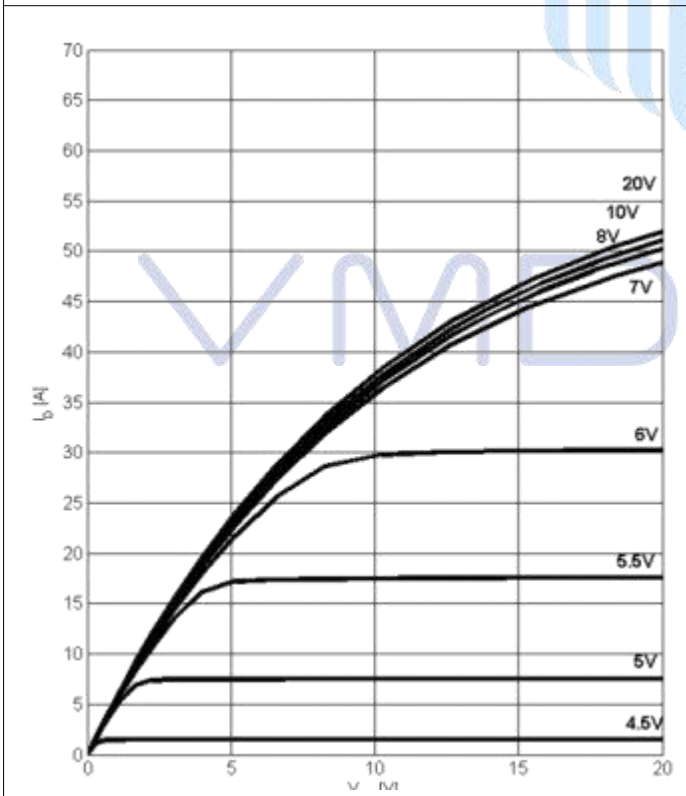
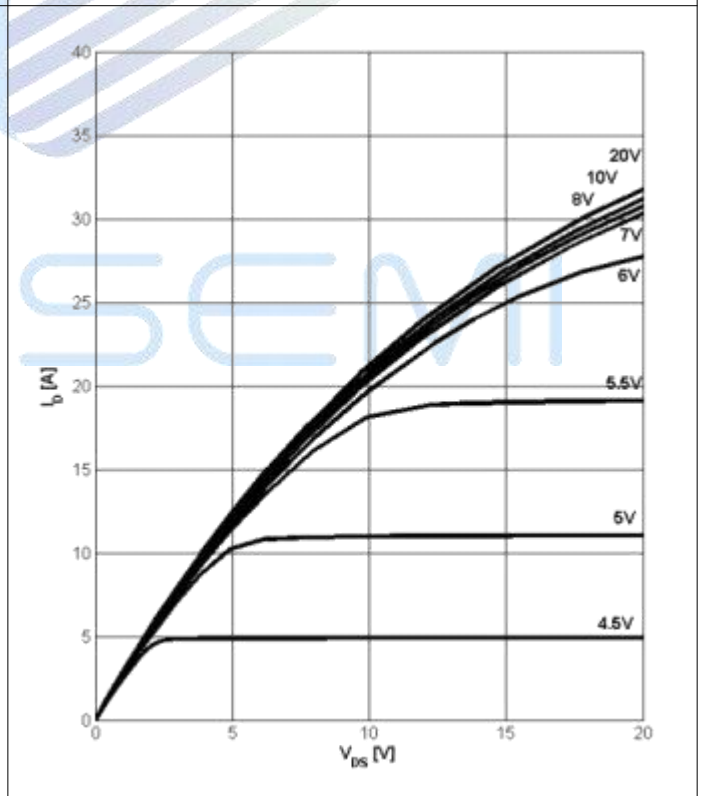
Figure 7: Typ Drain-Source On- State Resistance

Figure 8: Typ Drain-Source On- State Resistance

Figure 9: Typ Output Characteristics $T_J = 25^{\circ}C$

Figure 10: Typ Output Characteristics $T_J = 125^{\circ}C$


Figure 11: Typ Capacitances

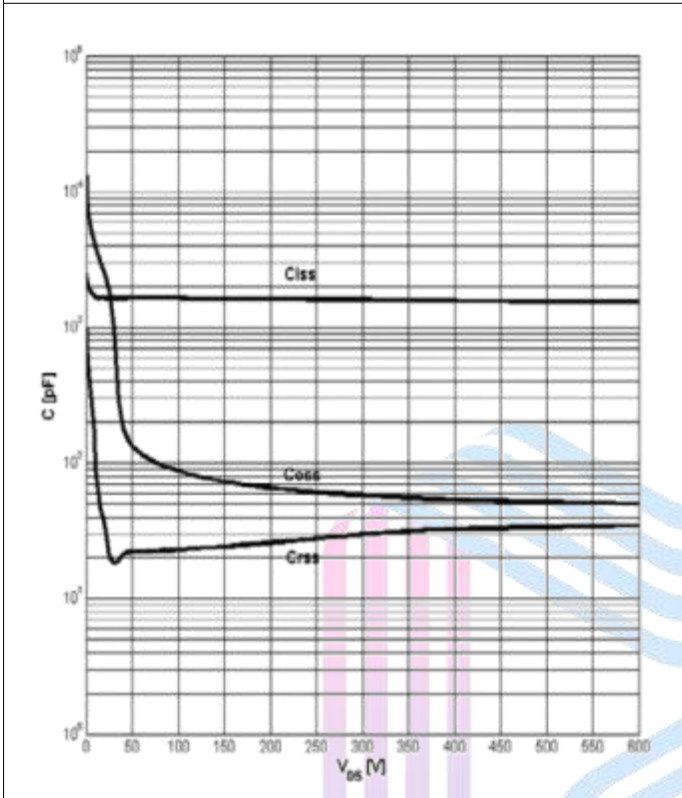


Figure 12: Typ Gate Charge

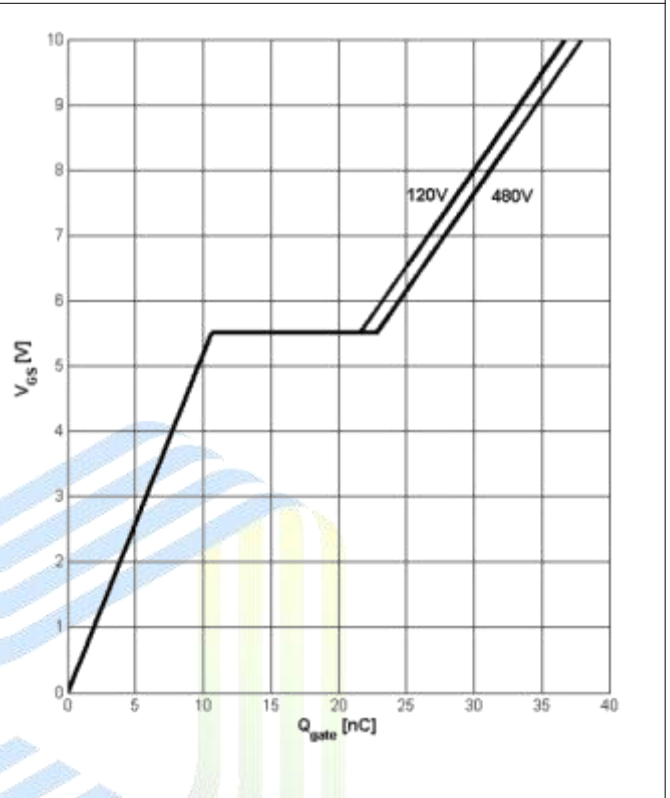


Figure 13: Coss Stored Energy

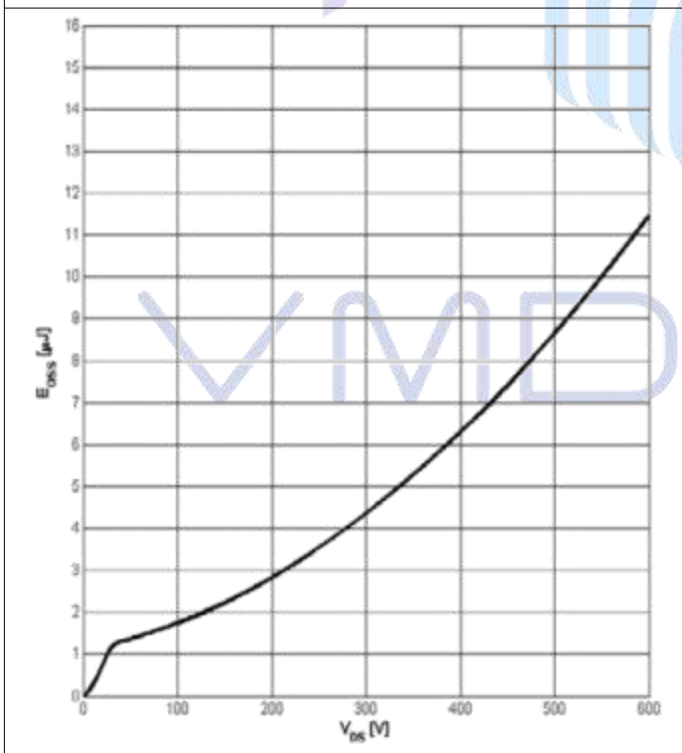


Figure 14: Forward Characteristics of Reverse Diode

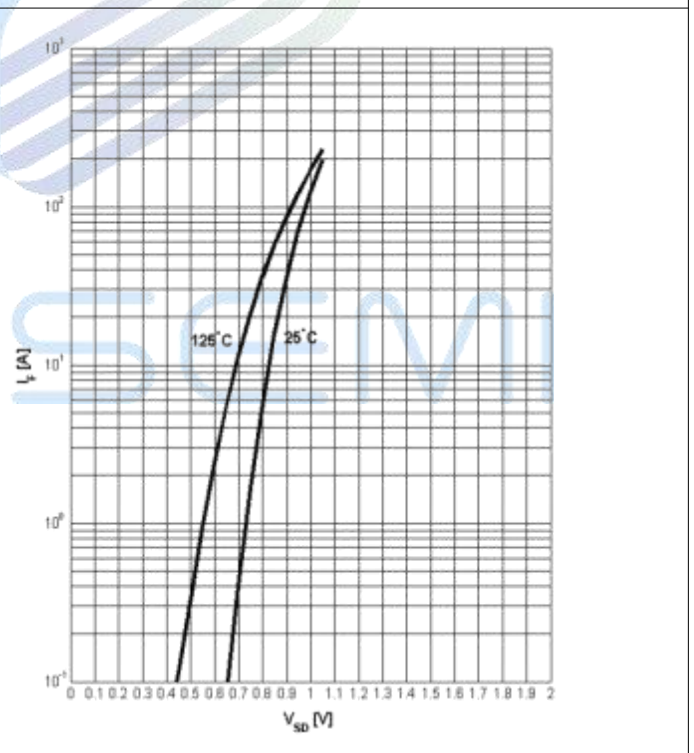
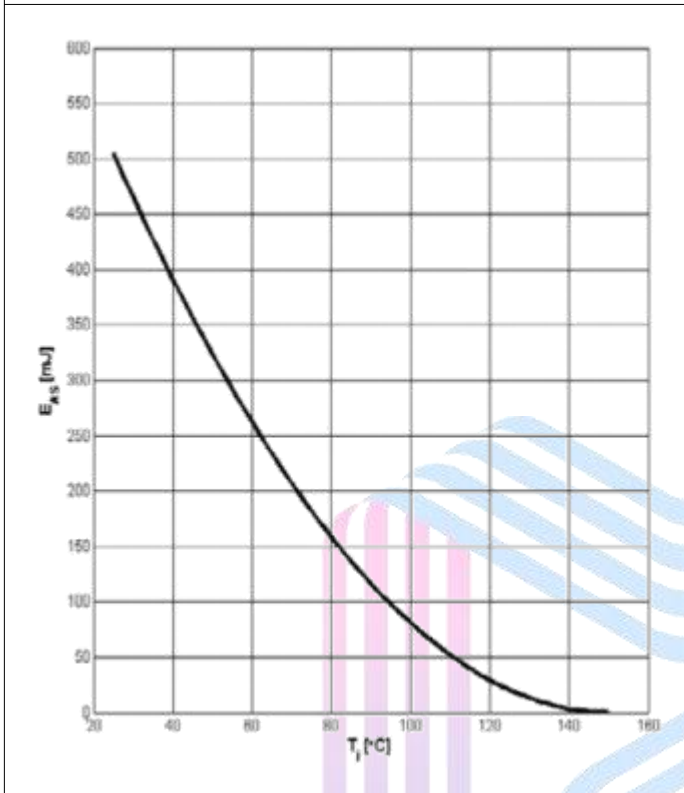
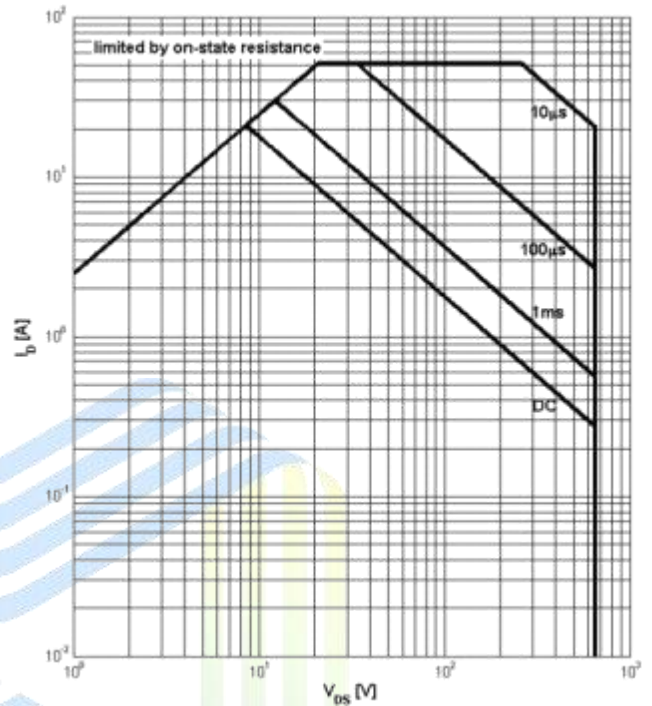
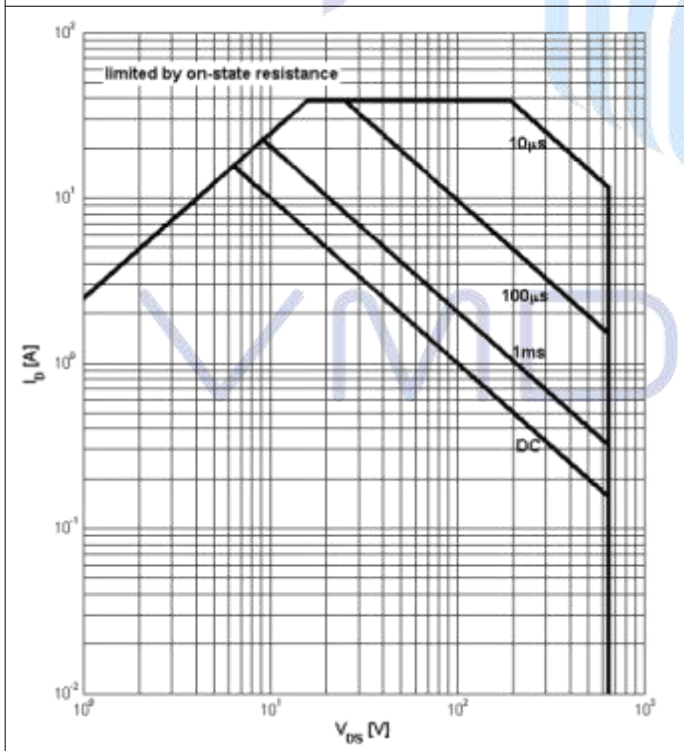
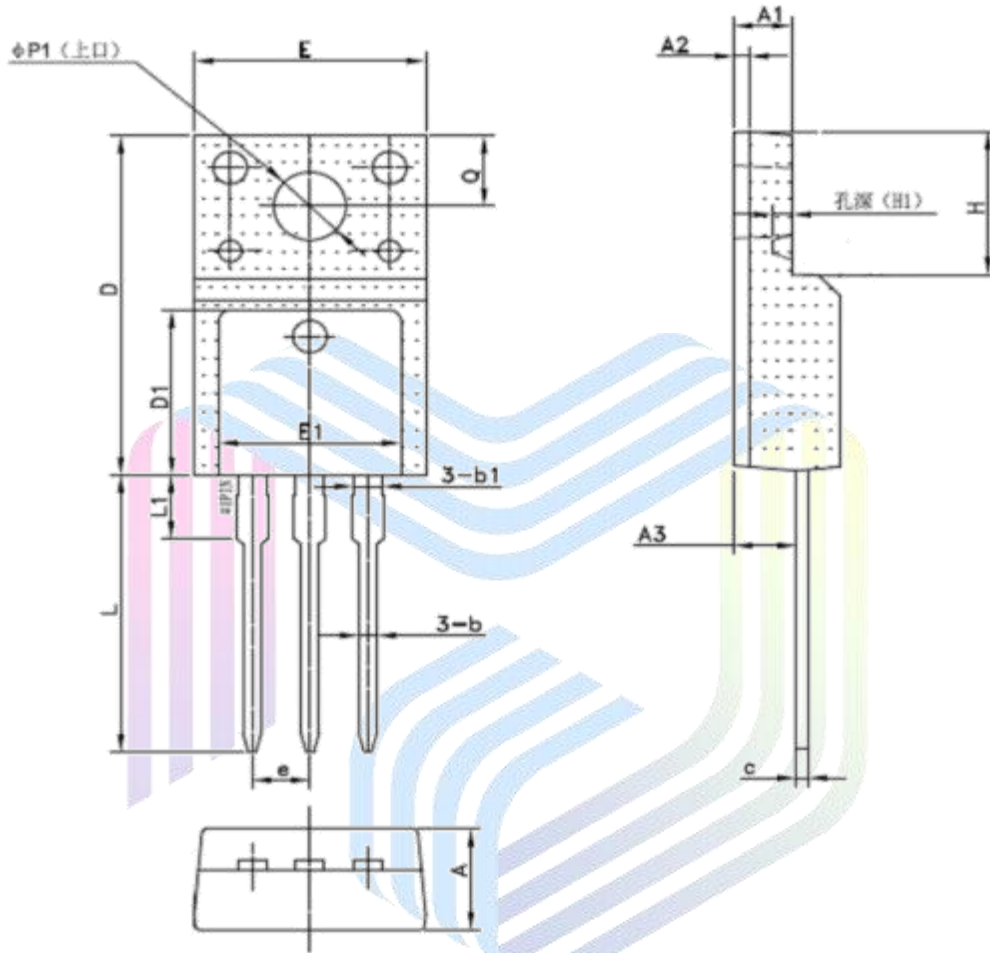
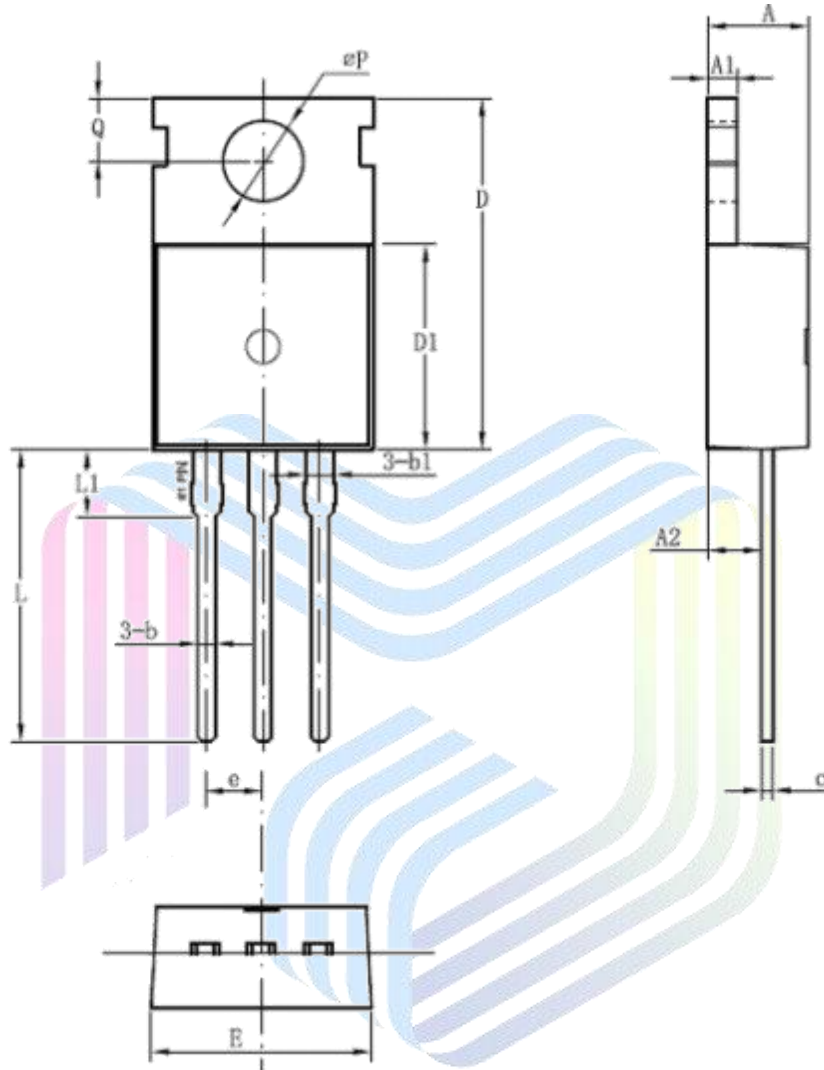


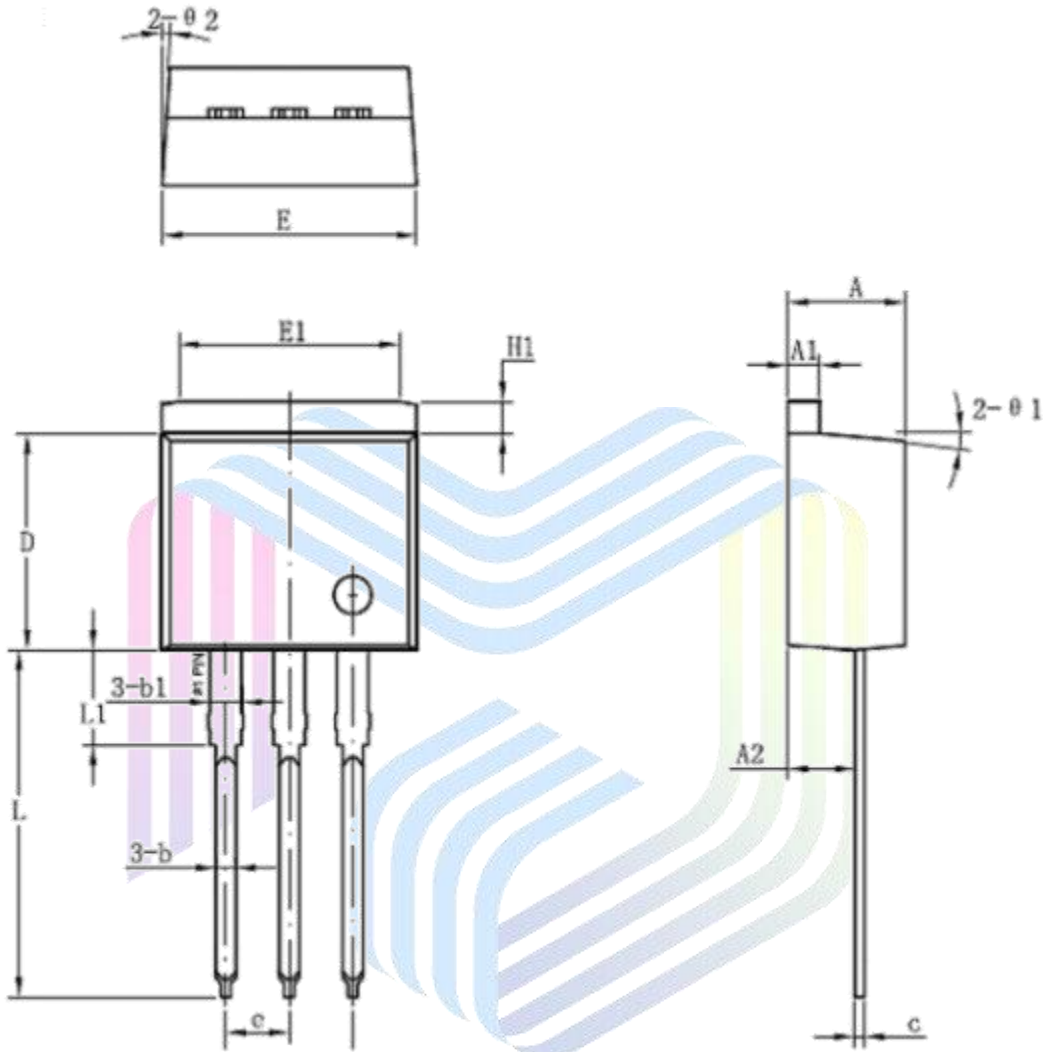
Figure 15: Avalanche Energy

Figure 16: Safe Operating Area $T_C= 25\text{ }^\circ\text{C}$

Figure 17: Safe Operating Area $T_C= 80\text{ }^\circ\text{C}$


Mechanical Dimensions:
TO-220F Package Information


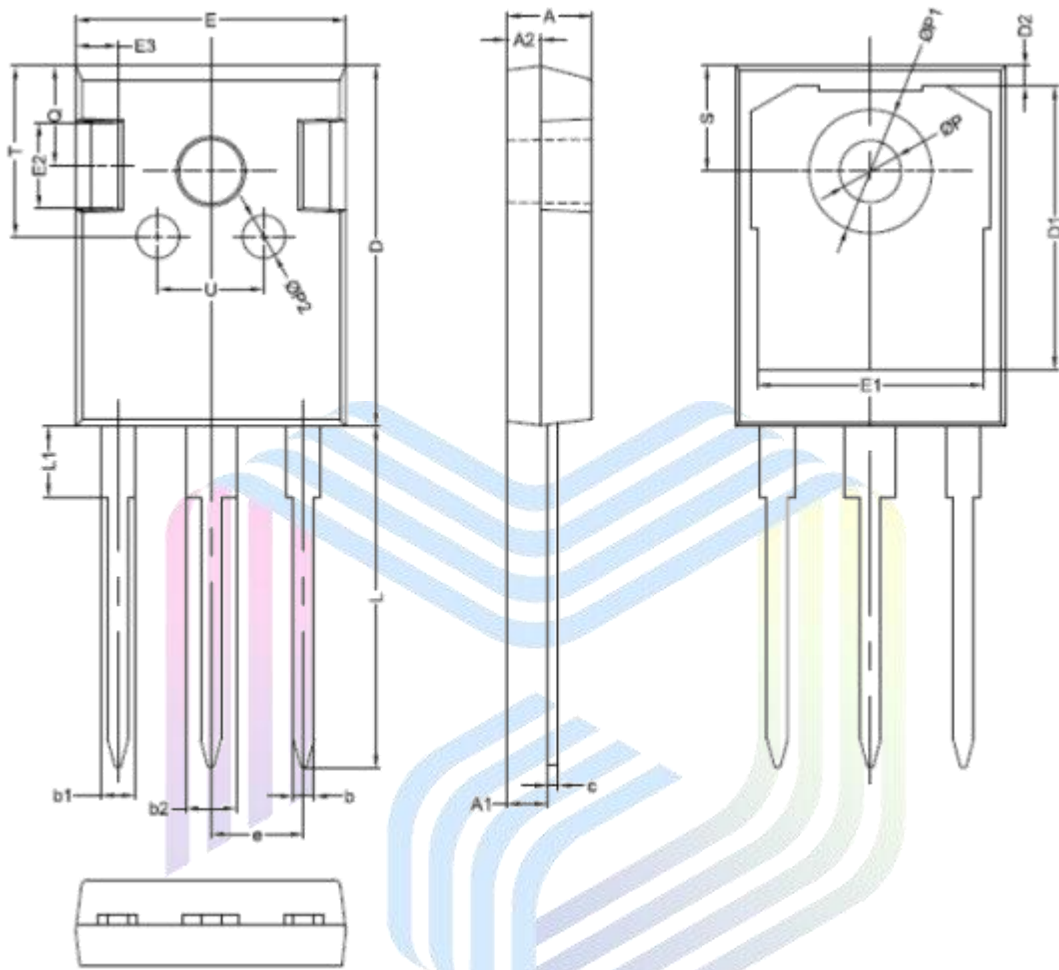
Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.70	4.90
A1	2.34	2.54	2.90
A2	-	0.70	-
A3	2.56	2.76	2.96
b	0.55	-	0.95
b1	-	1.28	-
c	0.42	0.50	0.70
D	14.70	-	16.07
D1	-	7.70	-
E	9.96	10.16	10.36
E1	-	8.00	-
e	2.54(BSC)		
H	-	6.70	-
(H1)	-	(0.81)	-
L	12.48	12.98	13.50
L1	-	2.93	-
φP1	-	3.18	-
Q	2.90	3.30	3.50

TO-220C Package Information


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.50	4.70
A1	1.20	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b1	-	1.27	-
c	0.40	0.50	0.65
D	15.20	15.70	16.20
D1	9.00	9.20	9.40
E	9.70	10.00	10.20
e	2.54(BSC)		
L	12.60	13.08	13.60
L1	-	3.00	-
ΦP	3.50	3.60	3.80
Q	2.60	2.80	3.00

TO-262 Package Information


Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.65	4.85
A1	1.17	1.27	1.40
A2	2.20	-	2.89
b	0.70	0.81	0.96
b1	-	1.27	-
c	0.36	0.40	0.61
D	8.55	-	9.4
E	9.80	10.10	10.31
E1	-	8.80	-
e	2.54(BSC)		
H1	1.00	1.25	1.40
L	12.60	-	14.08
L1	-	3.8	-
$\theta 1$	-	5°	-
$\theta 2$	-	4°	-

TO-247 Package Information


Symbol	Dimensions(mm)			Symbol	Dimensions(mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	4.80	5.00	5.20	E2	-	5.00	-
A1	2.21	2.41	2.61	E3	-	2.50	-
A2	1.90	2.00	2.10	e	5.44(BSC)		
b	1.10	1.20	1.35	L	19.42	19.92	20.42
b1	-	2.00	-	L1	-	4.13	-
b2	-	3.00	-	P	3.50	3.60	3.70
c	0.55	0.60	0.75	P1	-	-	7.40
D	20.80	21.00	21.20	P2	-	2.50	-
D1	-	16.55	-	Q	-	5.80	-
D2	-	1.20	-	S	6.05	6.15	6.25
E	15.60	15.80	16.00	T	-	10.00	-
E1	-	13.30	-	U	-	6.20	-

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Via-Media Semiconductor Limited Company

<http://www.vmdsemi.com>

Main Sites:

- Headquarters

Hangzhou Via-Media Semiconductor Co., LTD.
1305- 1306, Building 71, No. 90, Wensan Road, Xihu
District, Hangzhou, Zhejiang Province, P.R. China
Tel: +86-0571-8515 0563

- Chengdu Office

Chengdu Winhi Semiconductor Co., LTD.
Floor 15, Building 5, No. 171, Hele 2nd Street,
Chengdu, Sichuan Province, P.R. China
Tel: +86-028-8505 0771

- Shanghai

Shanghai R&D Center.
1506~ 1508, Xinyin Building, 888 Yishan Road,
Shanghai, P.R of China
Tel: +86- 021-54201999

- Shenzhen

Shenzhen Sales Center.
17B, No. 1 Phoenix Building, 2008 Shennan Road,
Shenzhen, P.R of China
Tel: +86-0755- 82570682

- Xi'an

Xi'an R&D Center
1703B, Building A, Greenland Center, Jinye Road,
High-Tech Zone, Xi'an, Shaanxi, P.R of China