VSXX065R18ANA

Datasheet

180mΩ, 650V, N-Channel Power MOSFET VSXX065R18ANA

General Description

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

Symbol

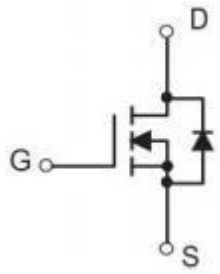


Figure 1 Symbol of VSXX065R18ANA

Features

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

Package Type

Figure 2 Package Type of VSXX065R18ANA

Application

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

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 ºC	I_D	21.2	A
Continuous Drain Current	T_C= 100 ºC		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}<=480V		dv/dt	50	V/ns
Reverse Diode dv/dt, V_{DS}<=480V, I_{SD}<=I_D		dv/dt	15	V/ns
Junction Temperature		T_J	150	ºC
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}= 3.6A, V_{DD}= 60V, R_G= 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	650			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= 650V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS} =30V, V_{DS}= 0V			0.1	uA
		V_{GS} =-30V, V_{DS}= 0V			- 1.0	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	2.4	3.4	4.4	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}= 10V, I_D= 10A		160	180	mΩ
Gate Resistance	Rg	f=1MHz, 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.....480V		301		
Total Gate Charge	Q_g	V_{DS}=480V		10.6		nC
Gate-Source Charge	Q_{gs}	V_{GS}=0 to 10V		12.2		
Gate-Drain Charge	Q_{gd}	I_D= 10A		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-offDelay Time	$t_{d(off)}$	I_D= 10A		76		
Turn-offFall Time	t_f	R_G=3.4Ω		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:

4. $C_{O(er)}$ is a fixed capacitance that gives the same stored energy as C_{OSS} while V_{DS} is rising from 0 to 480V
5. $C_{O(tr)}$ 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

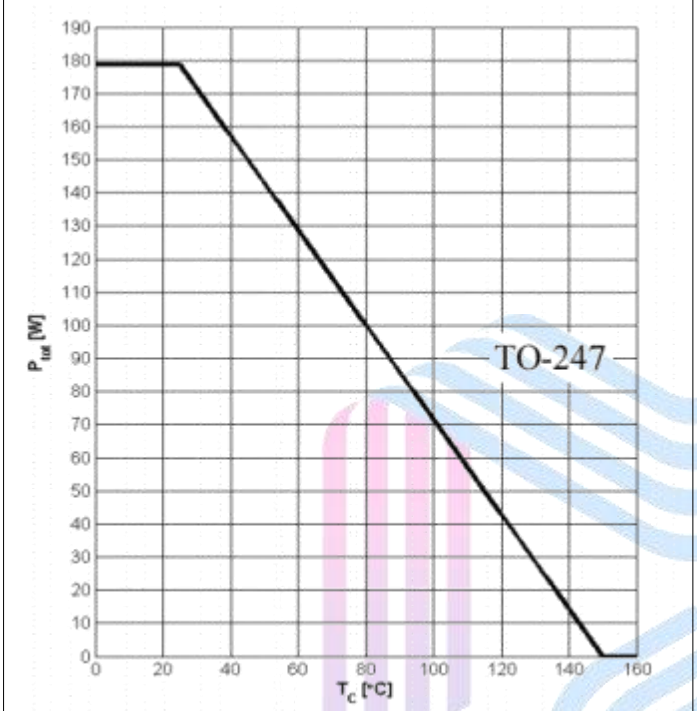


Figure 4: Max Transient Thermal Impedance

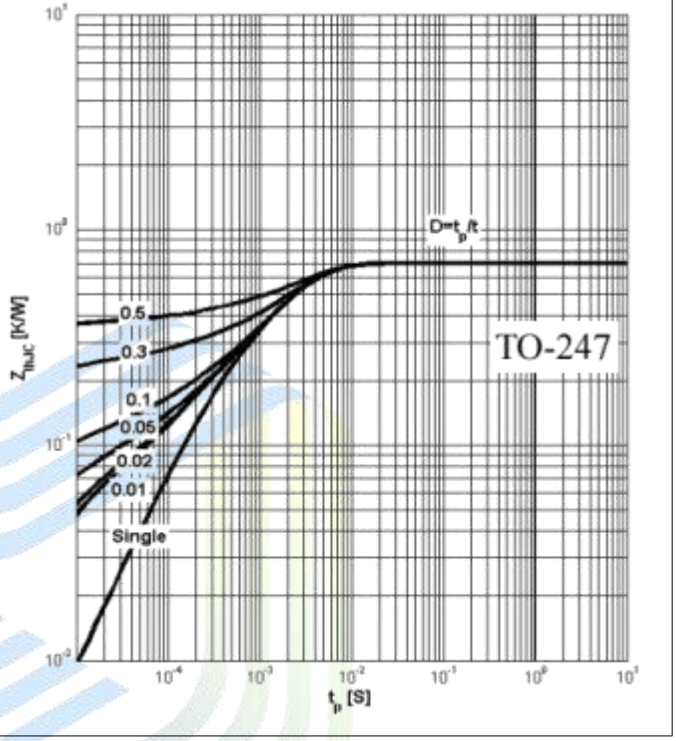


Figure 5: Drain-Source Breakdown Voltage

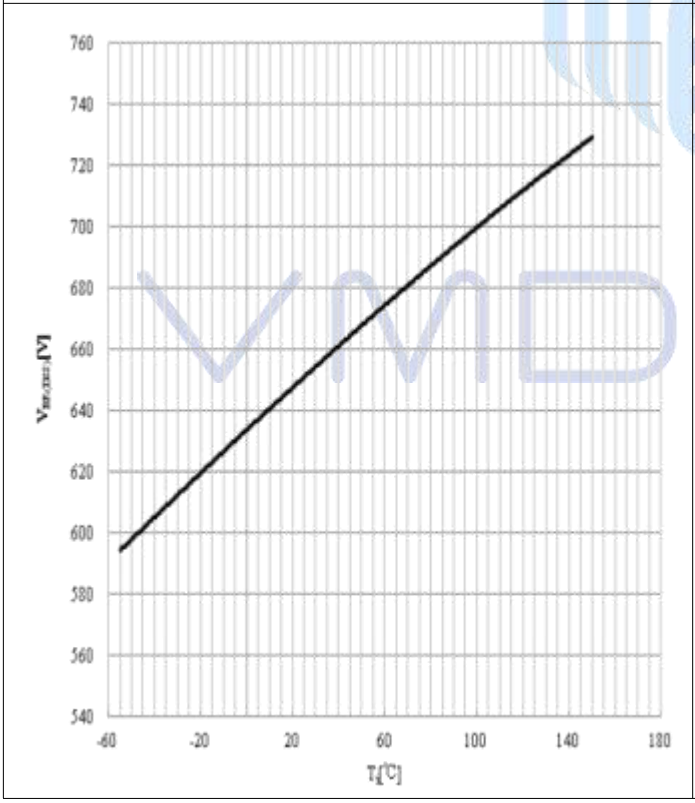


Figure 6: Typ Transfer Characteristics

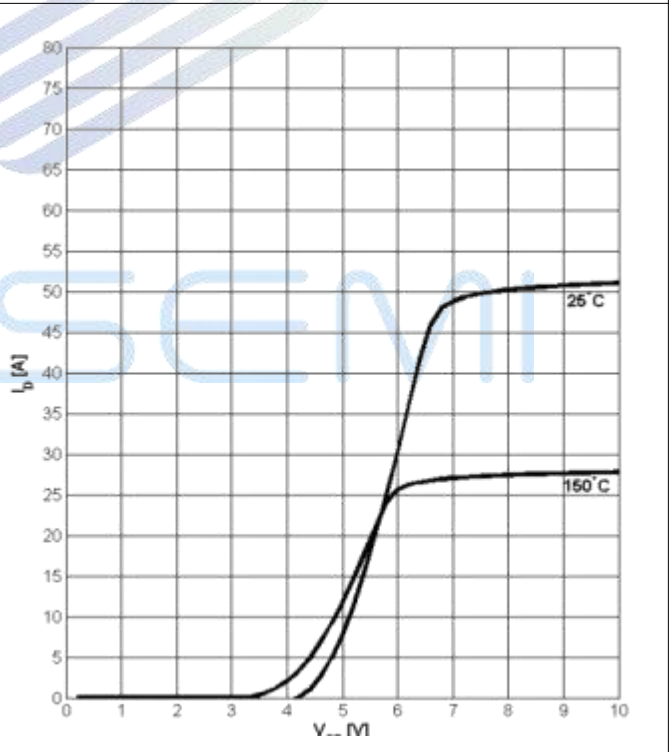


Figure 7 : Typ Drain- Source On- State Resistance

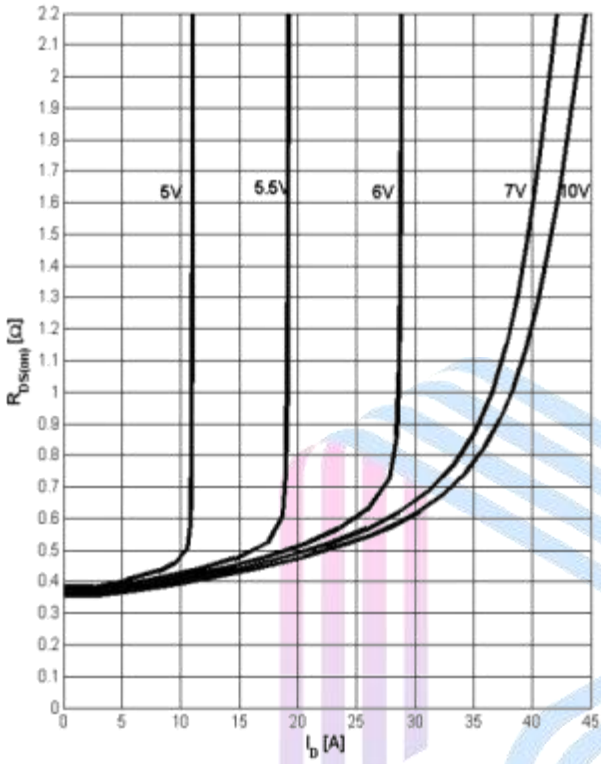


Figure 8 : Typ Drain- Source On- State Resistance

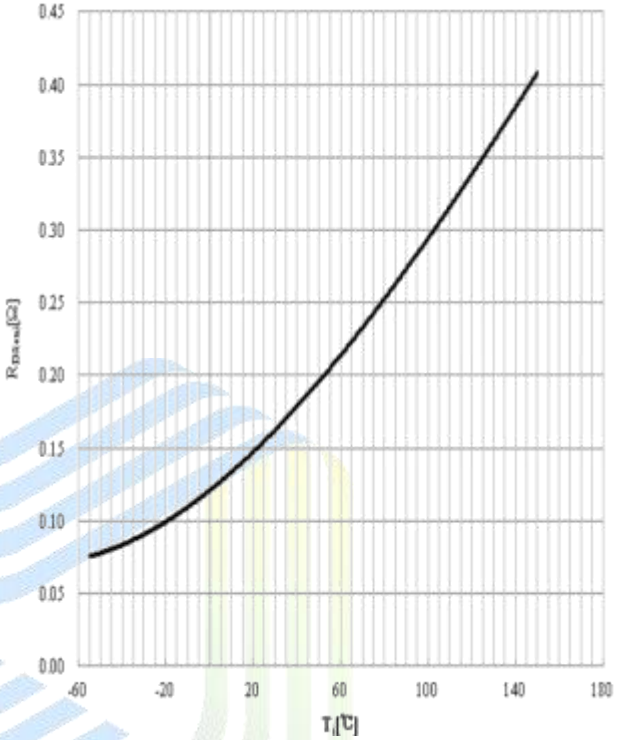


Figure 9 : Typ Output Characteristics T_J= 25 °C

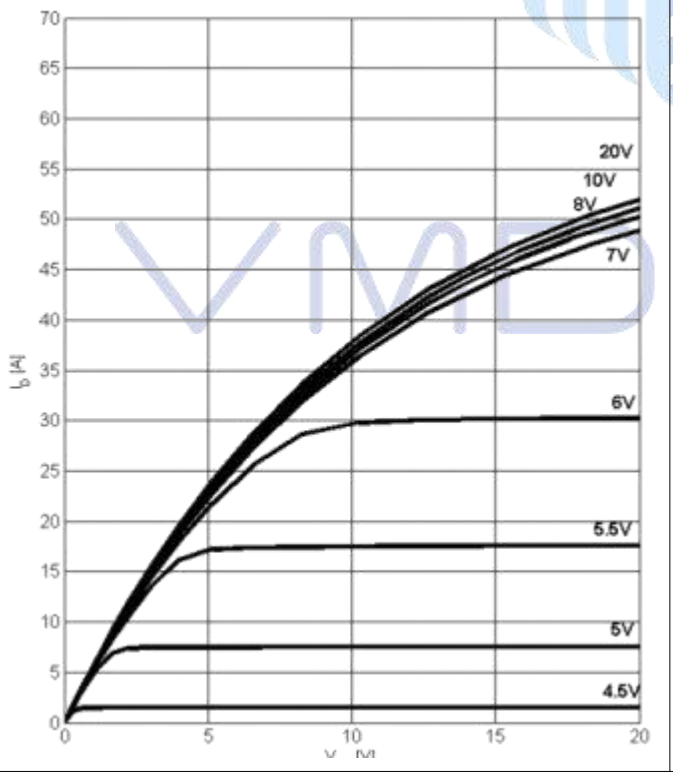


Figure 10 : Typ Output Characteristics T_J= 125 °C

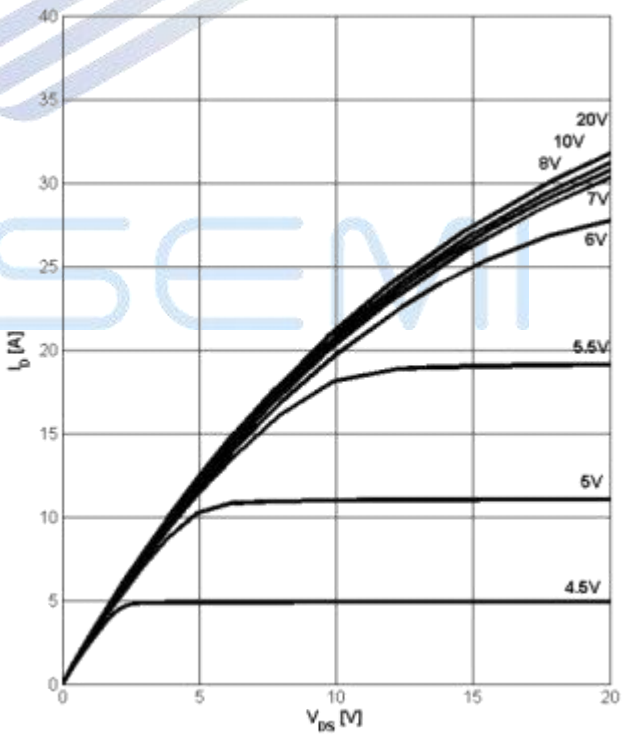


Figure 11: Typ Capacitances

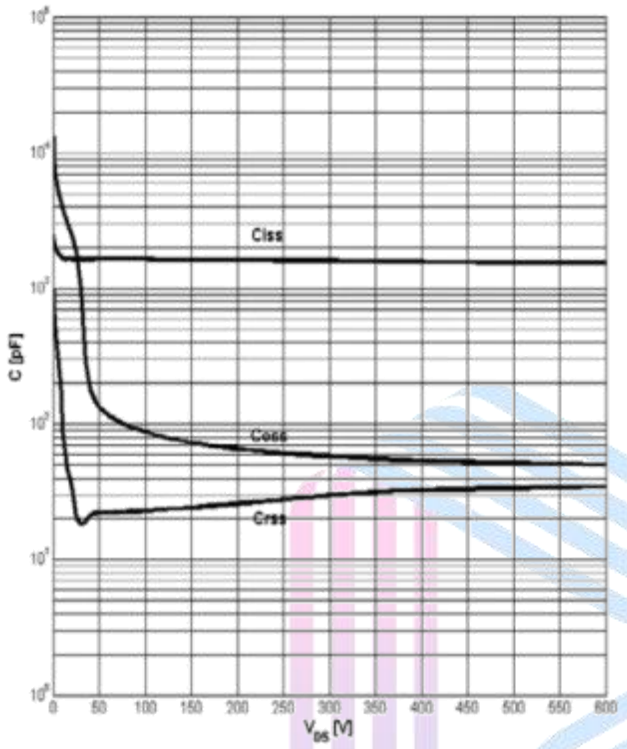


Figure 12: Typ Gate Charge

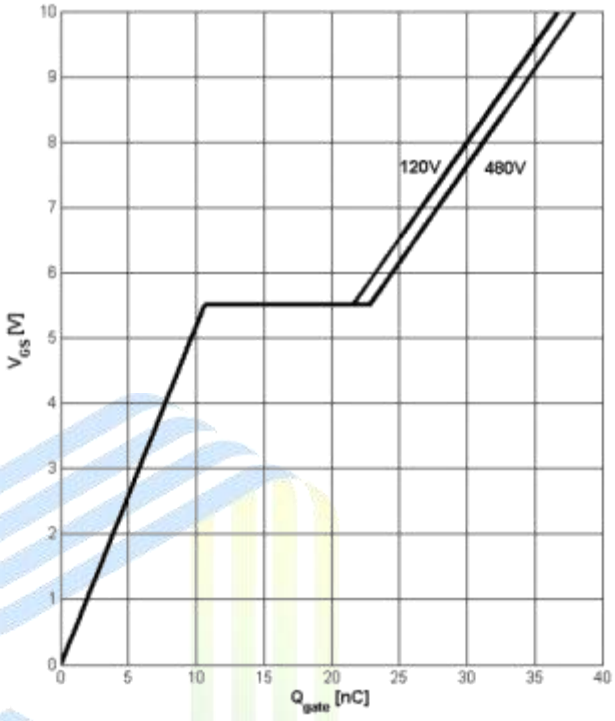


Figure 13: Coss Stored Energy

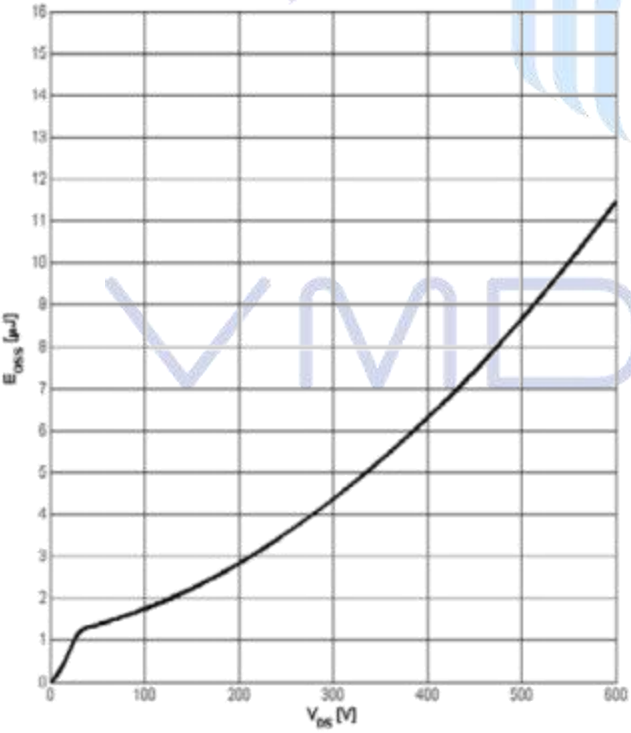


Figure 14: Forward Characteristics of Reverse Diode

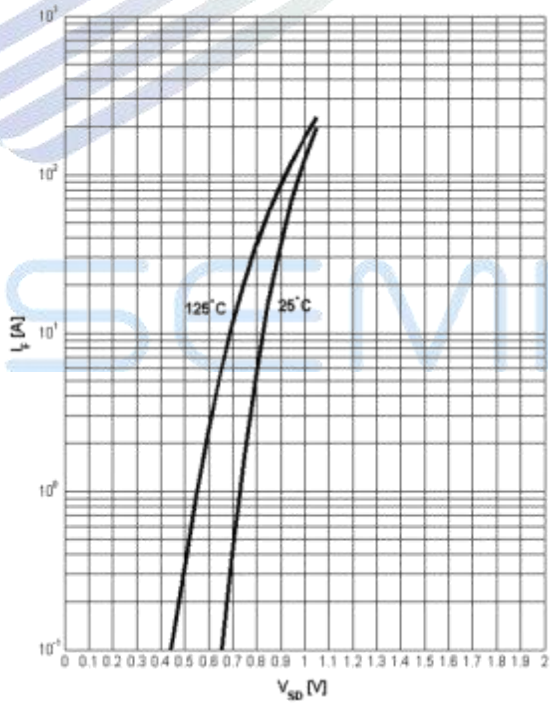


Figure 15: Avalanche Energy

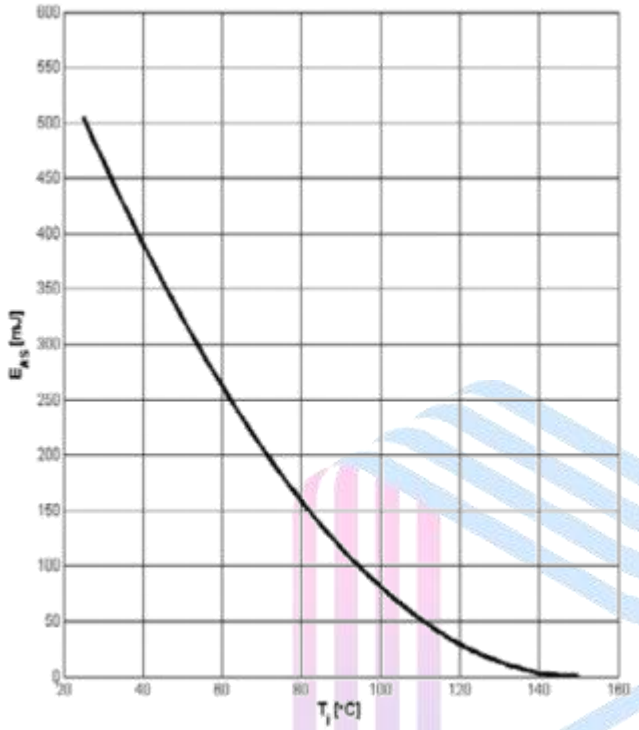


Figure 16: Safe Operating Area T_C= 25 °C

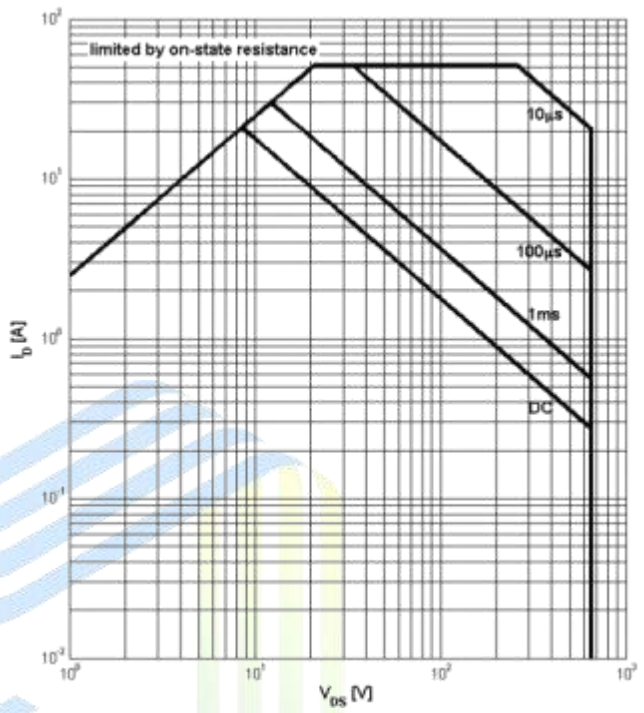
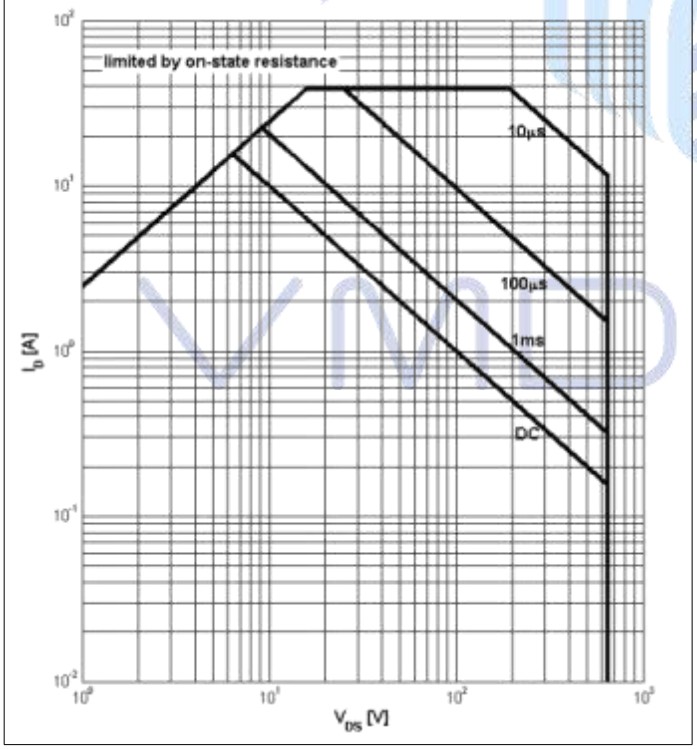
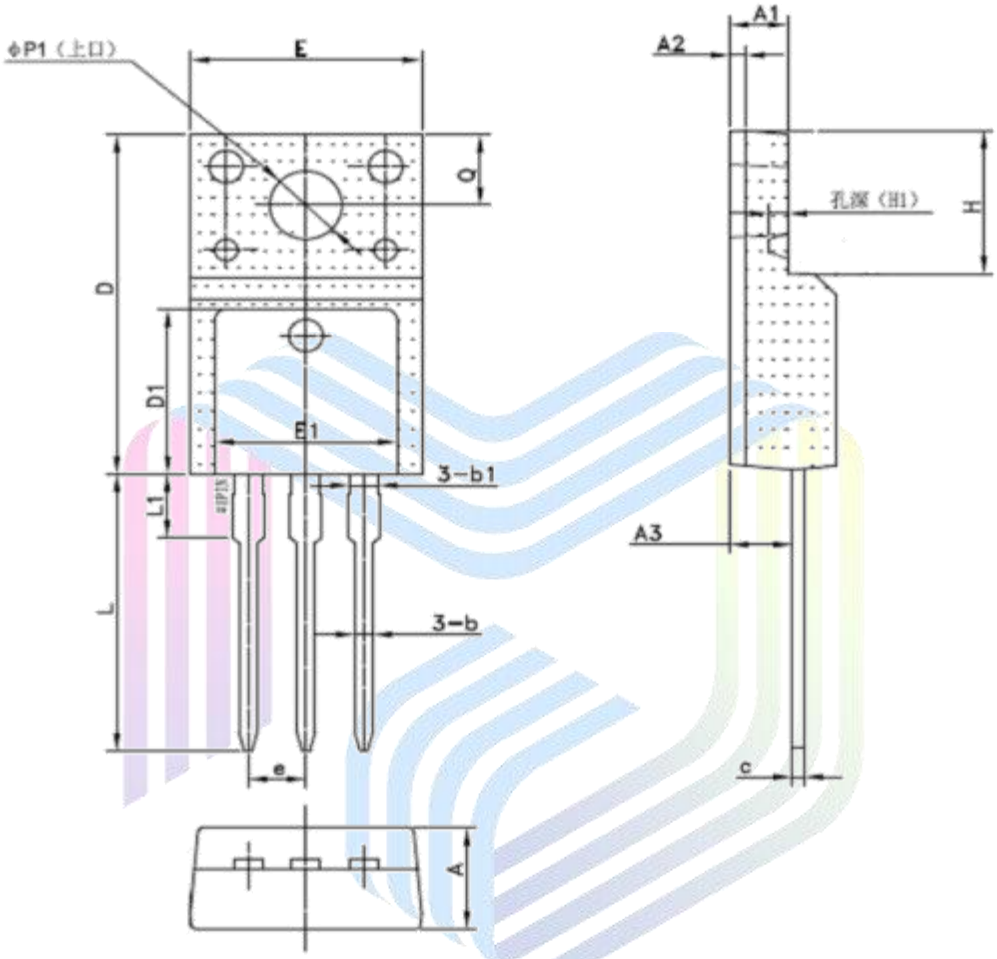


Figure 17: Safe Operating Area T_C= 80 °C



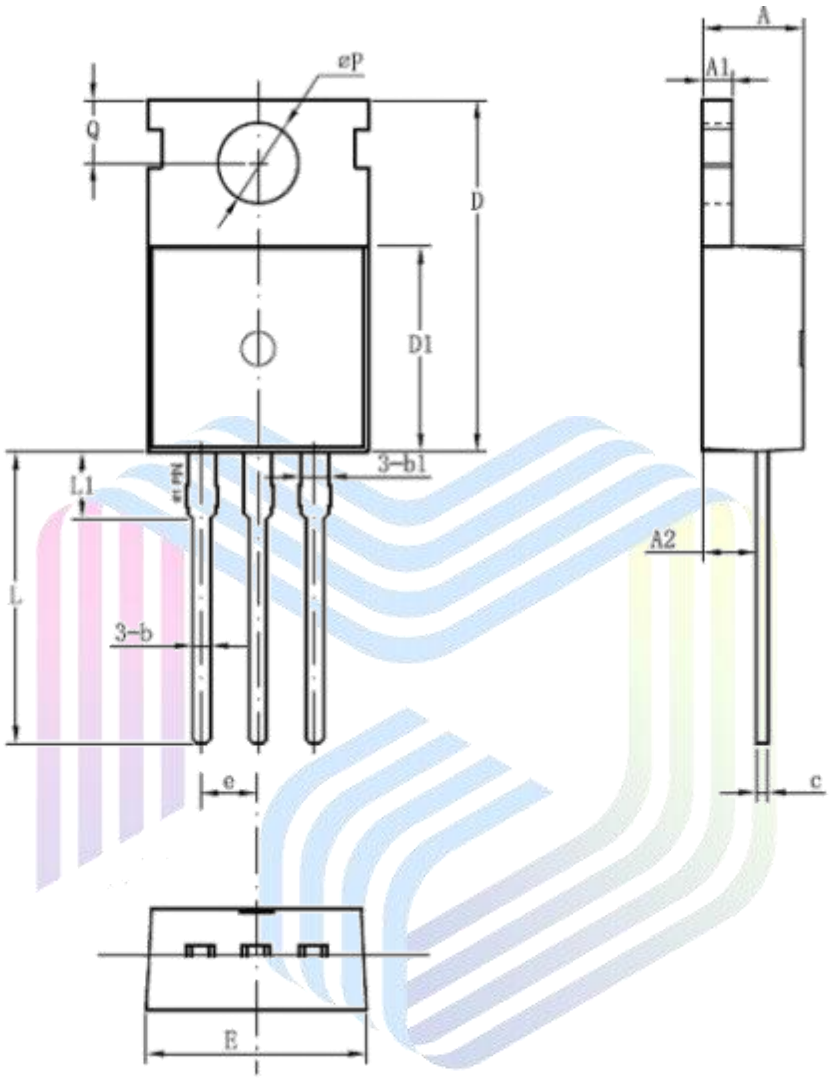
Mechanical Dimensions:

TO-220F Package Information



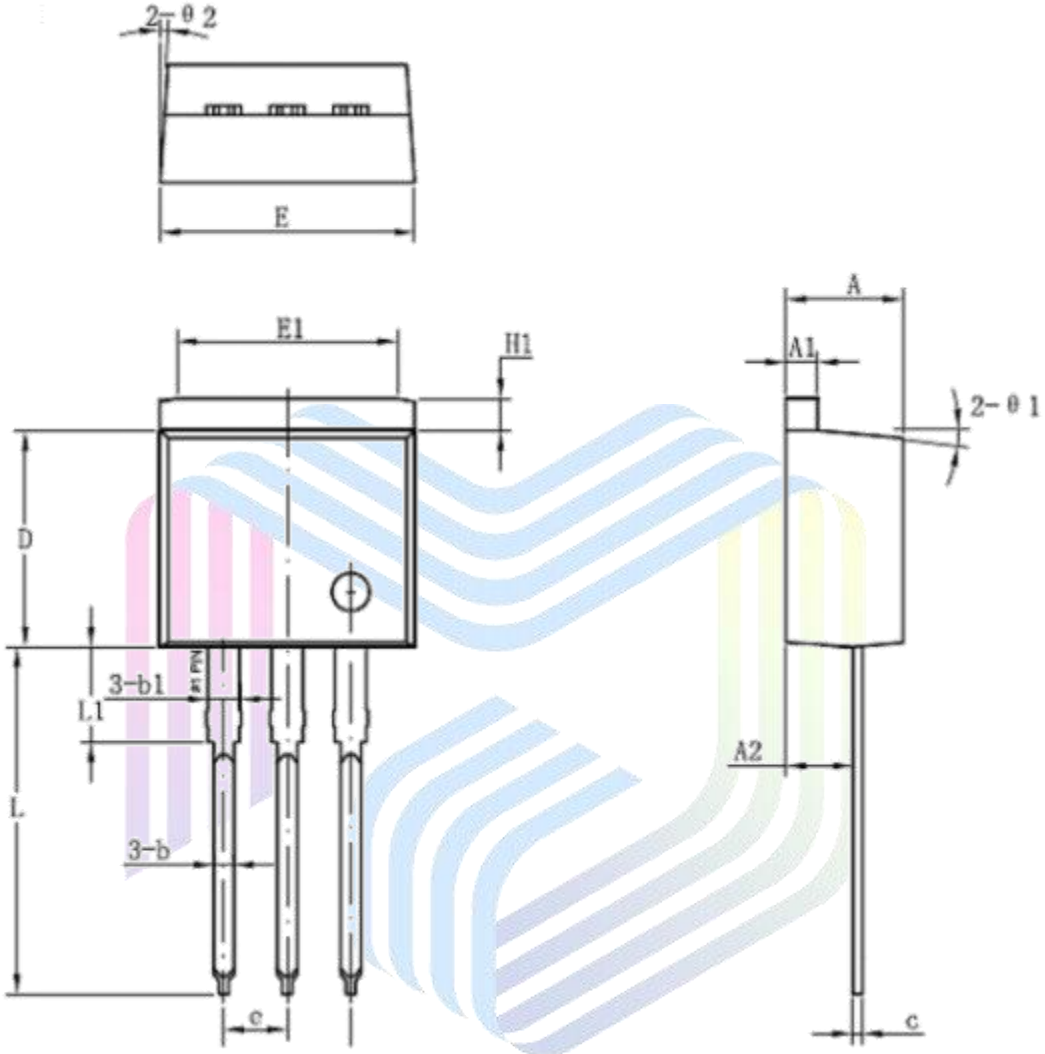
Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.70	4.90
A1	2.34	2.54	2.90
A2	-	0.70	-
A3	2.56	2.76	2.96
b	0.55	-	0.95
b1	-	1.28	-
c	0.42	0.50	0.70
D	14.70	-	16.07
D1	-	7.70	-
E	9.96	10.16	10.36
E1	-	8.00	-
e	2.54(BSC)		
H	-	6.70	-
(H1)	-	(0.81)	-
L	12.48	12.98	13.50
L1	-	2.93	-
ΦP1	-	3.18	-
Q	2.90	3.30	3.50

TO-220C Package Information



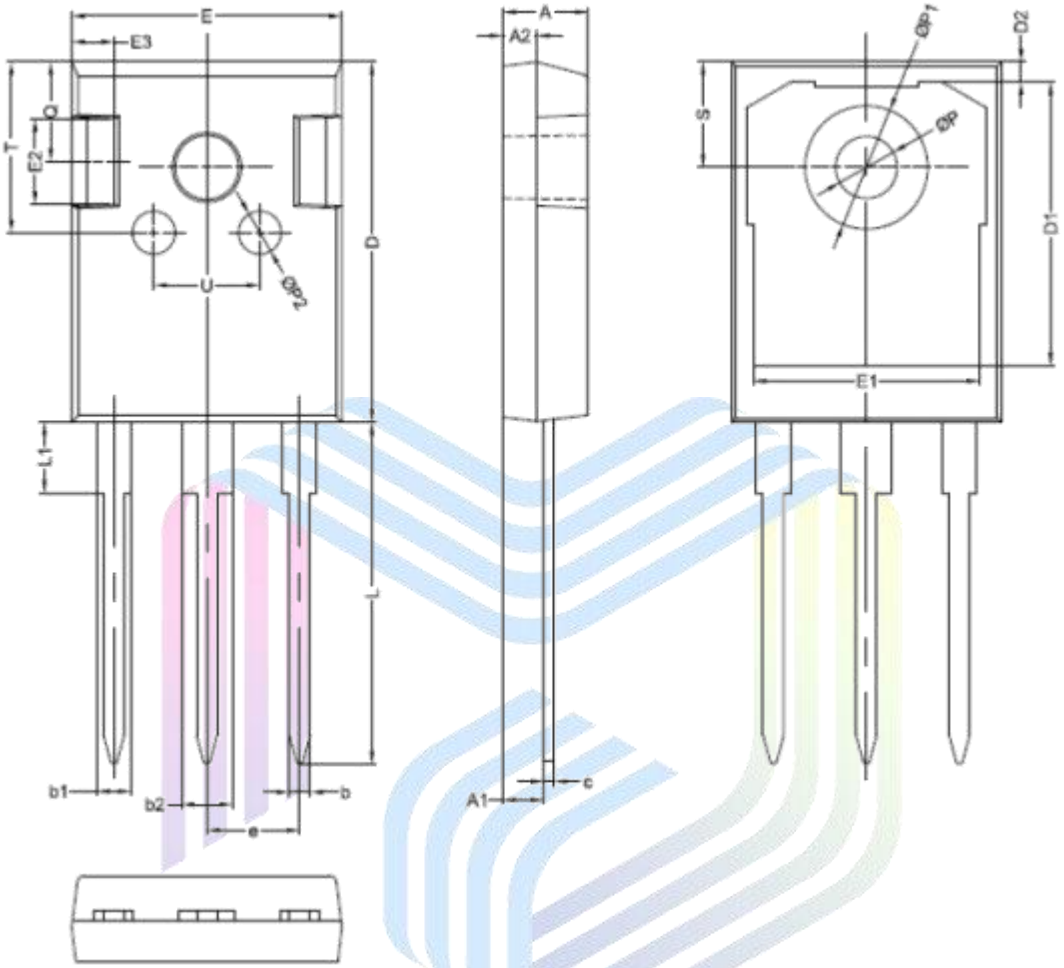
Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.30	4.50	4.70
A1	1.20	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b1	-	1.27	-
c	0.40	0.50	0.65
D	15.20	15.70	16.20
D1	9.00	9.20	9.40
E	9.70	10.00	10.20
e	2.54(BSC)		
L	12.60	13.08	13.60
L1	-	3.00	-
ΦP	3.50	3.60	3.80
Q	2.60	2.80	3.00

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	-
θ1		5°	
θ2		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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