VSXX060R22BNA

Datasheet

General Description

The VSXX060R22BNA is a high voltage power MOSFET, fabricated using advanced super junction technology. The resulting device has extremely low on resistance, low gate charge and fast switching time.The VSXX060R22BNA break down voltage is 600V and it has a high rugged avalanche characteristics. The VSXX060R22BNA is available in TO-251, TO-252 and TO-220F packages.

Symbol

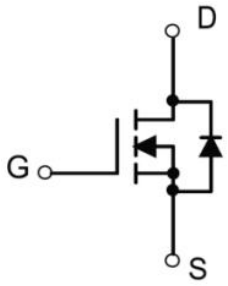


Figure 1 Symbol of VSXX060R22BNA

Features

- Low $R_{DS(ON)\_max}$ = 2.2Ω @ V_{GS} = 10V
- Ultra Low Gate Charge, Qg= 1.5nC typ.
- Ultra Fast switching capability
- Robust design with better EAS performance

Package Type

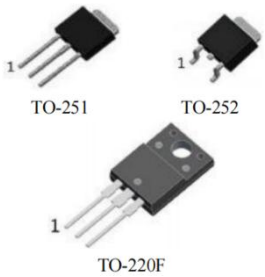


Figure 2 Package Type of VSXX060R22BNA

Application

- LED Lighting Power
- General Used Charger / Adapter

Ordering Information

VSXX060R22BNA

TO-251: TJ

TO-252: TL Package

TO-220F: TD

Product Name	Package
VSTJ060R22BNA	TO-251
VSTL060R22BNA	TO-252
VSTD060R22BNA	TO-220F

Absolute Maximum Ratings Note1

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25ºC	I_D	1.9	A
	T_C= 125ºC		0.8	
Pulsed Drain Current Note 2		I_{DM}	5.5	A
Avalanche Energy, Single Pulse Note 3		E_{AS}	11	mJ
Avalanche Energy, Repetitive Note 2		E_{AR}	0.05	mJ
Avalanche Current, Repetitive Note 2		I_{AR}	0.57	A
Continuous Diode Forward Current		I_S	1.9	A
Diode Pulse Current		$I_{S.PULSE}$	5.5	A
Operating Junction Temperature		T_J	150	ºC

Note:

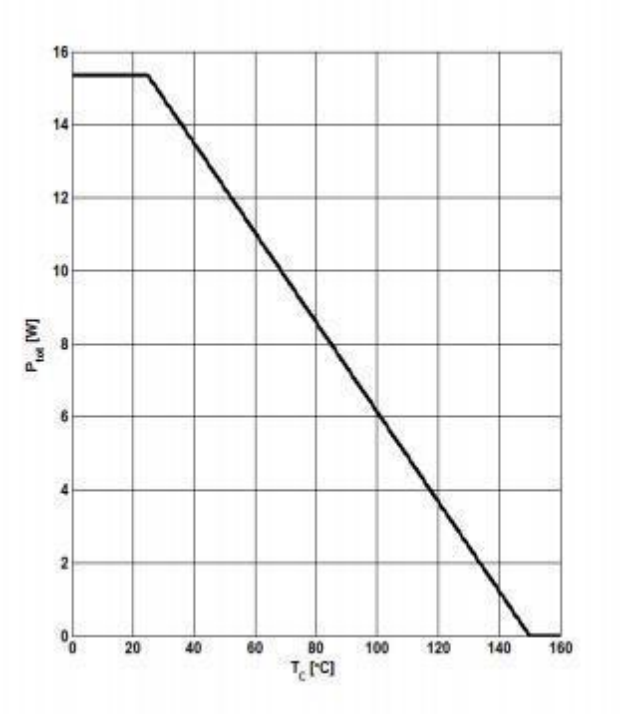
1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. I_{AS} = 0.57A, V_{DD} = 60V, 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		B_{VDSS}	V_{GS}=0V, I_D=250uA	600			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=600V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=30V, V_{DS}=0V			100	nA
	Reverse	I_{GSSR}	V_{GS}=-30V, V_{DS}=0V			- 100	
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	2.6	3.5	4.4	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}= 10V, I_D=0.5A		1.82	2.2	Ω
Gate Resistance		R_G	f=1MHz, Open Drain		6.7		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=25V		50		pF
Output Capacitance		C_{OSS}	V_{GS}=0V		72		
Reverse Transfer Capacitance		C_{RSS}	f=1MHz		1.6		
Turn-on Delay Time		$t_{d(on)}$	V_{DD}=400V		20		ns
Rise Time		t_r	I_D= 1.0A		7		
Turn-off Delay Time		$t_{d(off)}$	R_G= 10Ω		40		
Fall Time		t_f	V_{GS}= 10V		7		
Gate Charge Characteristics							
Gate to Source Charge		Qgs	V_{DD}=480V		0.48		nC
Gate to Drain Charge		Qgd	I_D= 1.0A		0.55		
Gate Charge Total		Qg	V_{GS}=0 to 10V		1.5		
Gate Plateau Voltage		Vplateau			5.7		V
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}= 1A		0.84	1.1	V
Reverse Recovery Time		t_{rr}	V_R= 100V,		110		ns
Reverse Recovery Charge		Q_{rr}	I_F= 1.0A		0.44		uC
Peak Reverse Recovery Current		I_{rrm}	dIF/dt=100A/us		7.0		A

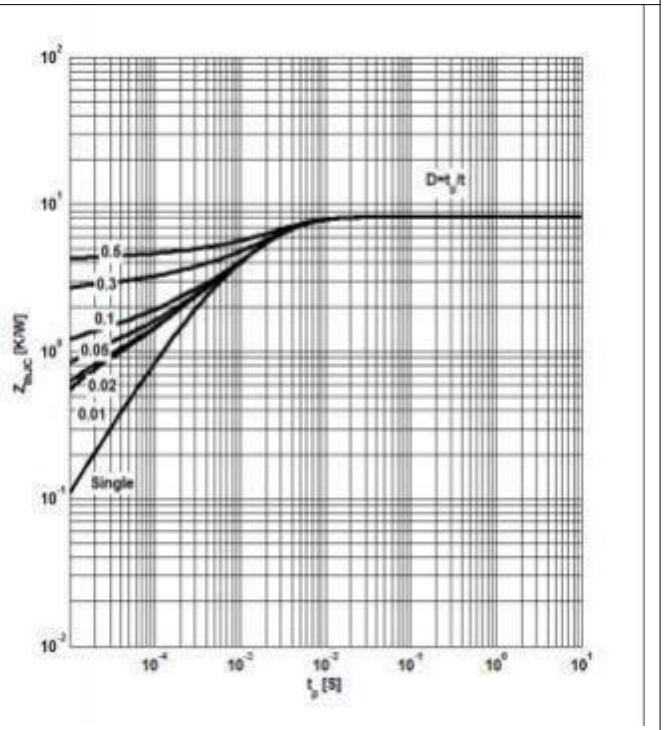
Typical Performance Characteristics

Figure 3: Power Dissipation



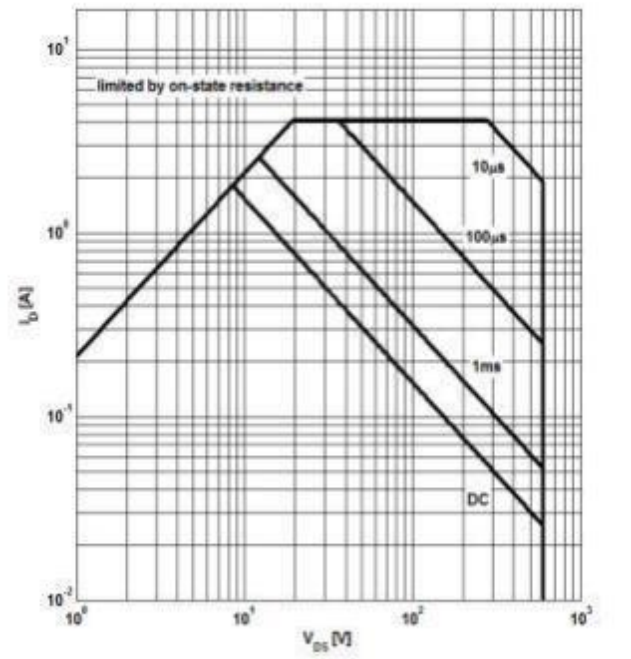
Ptot = f(Tc)

Figure 4: Max. Transient Thermal Impedance



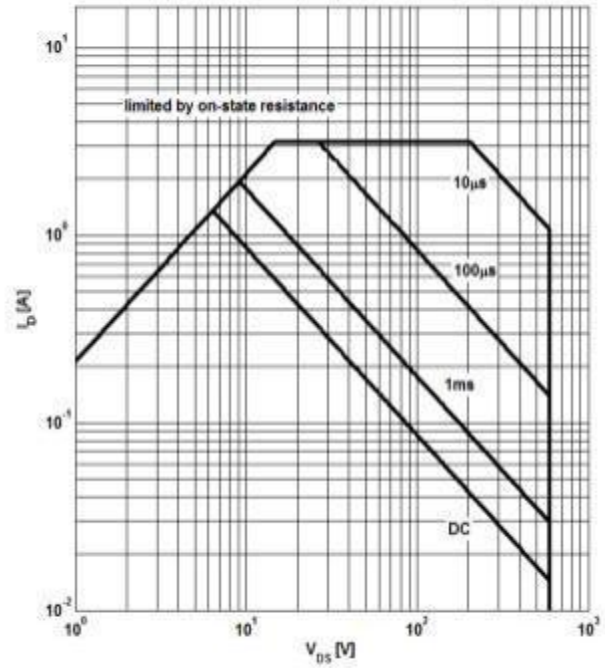
Z(thJC) = f(tp); parameter: D = tp/T

Figure 5: Safe Operating Area



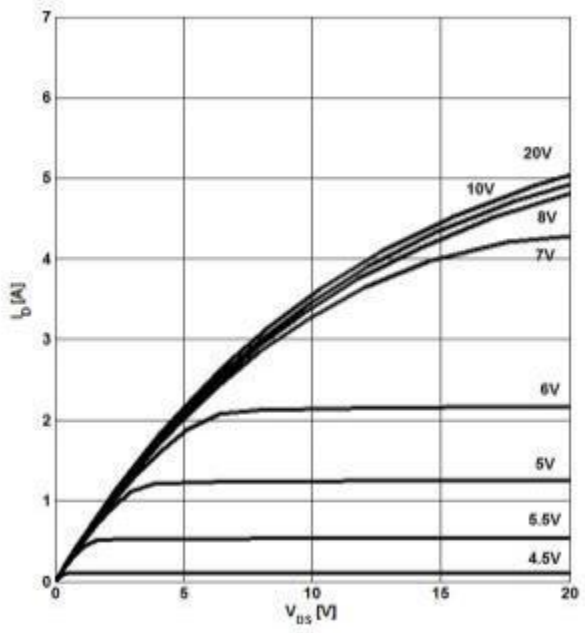
ID= f(V_{DS}); Tc= 25°C; V_{GS}>7V; parameter tp

Figure 6: Safe Operating Area



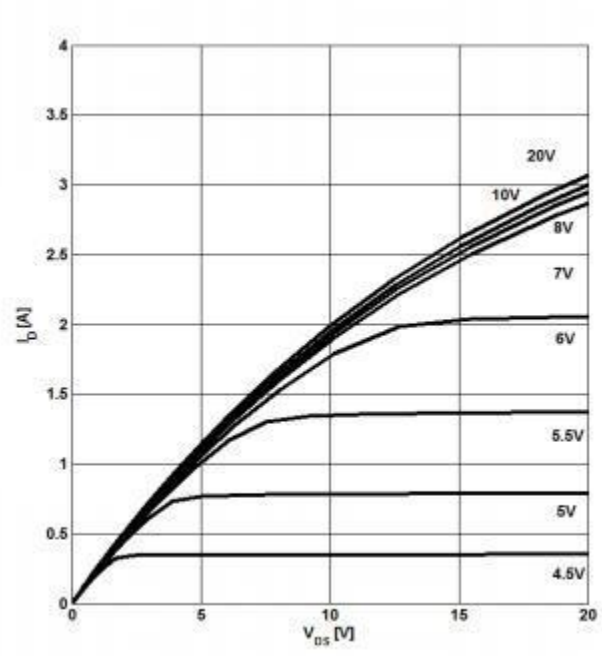
ID= f(V_{DS}); Tc= 80°C; V_{GS}>7V; parameter tp

Figure 7: Typ. Output Characteristics



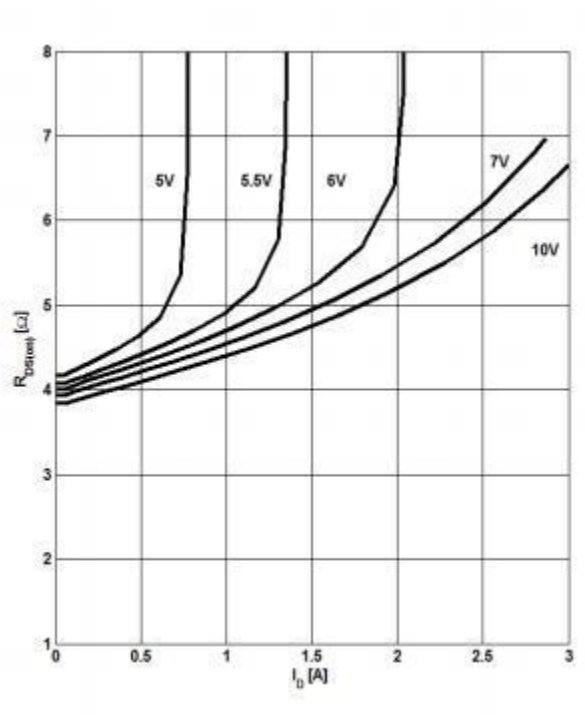
ID= f(V_{DS}); Tj= 25°C; parameter: V_{GS}

Figure 8: Typ. Output Characteristics



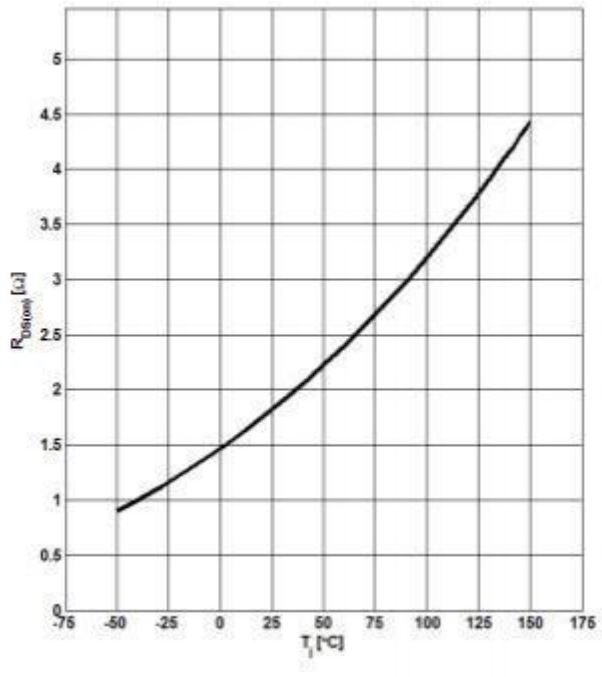
ID= f(V_{DS}); Tj= 125°C; parameter: V_{GS}

Figure 9: Typ. Drain-Source On-State Resistance



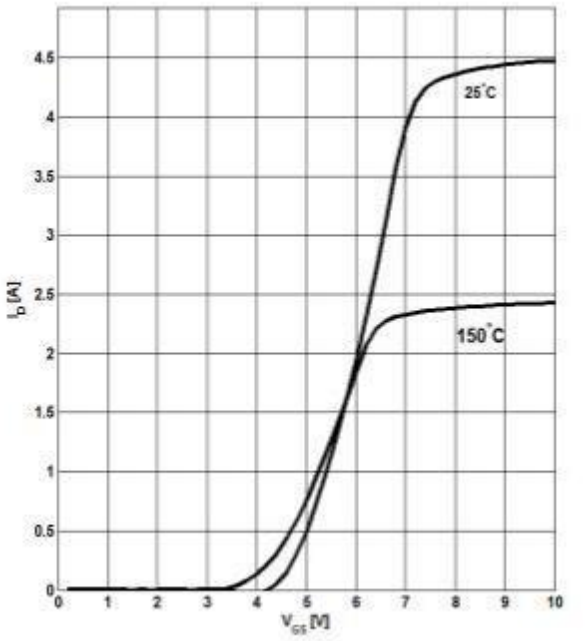
$R_{DS(ON)}$ =f(I_D); Tj= 125°C; parameter: V_{GS}

Figure 10: Typ. Drain-Source On-State Resistance



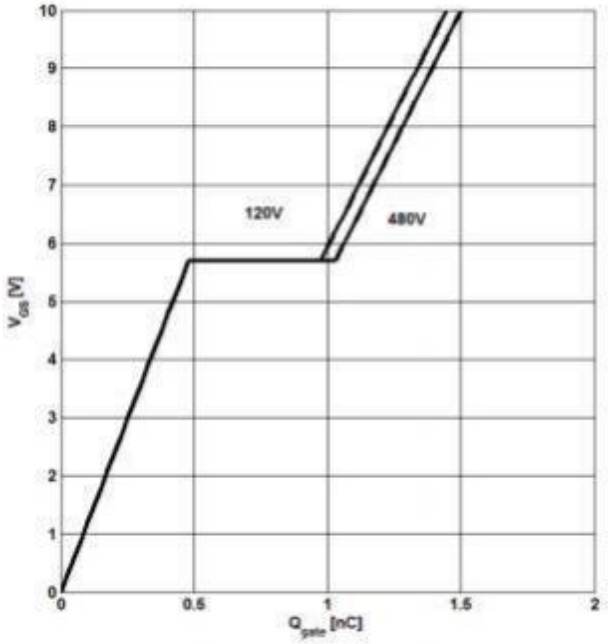
$R_{DS(ON)}$=f(Tj); I_D=0.5A; V_{GS}= 10V

Figure 11: Typ. Transfer Characteristics



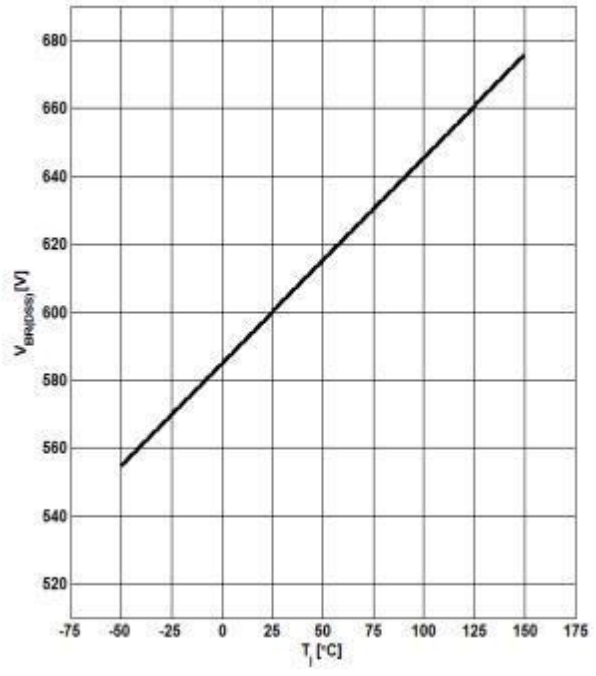
ID= f(V_{GS}); V_{DS} = 20V

Figure 12: Typ. Gate Charge



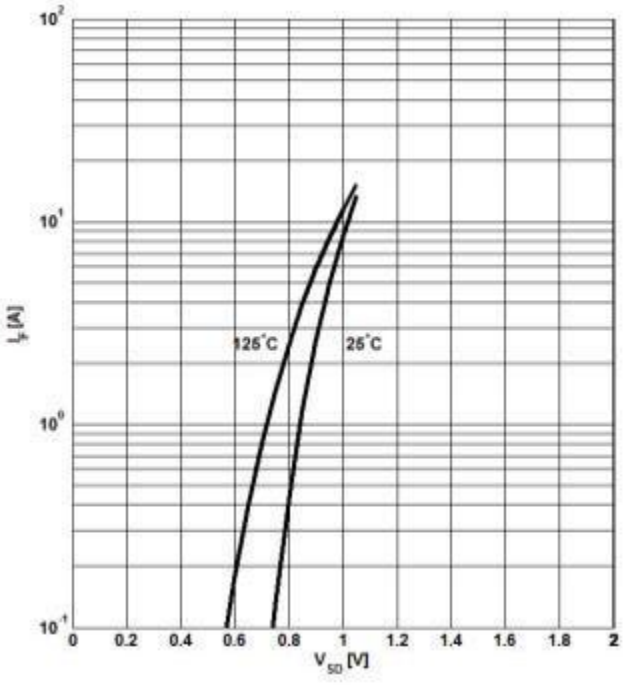
V_{GS}= f(Q_{gate}), I_D= 1.0A pulsed

Figure 13: Drain-Source Breakdown Voltage



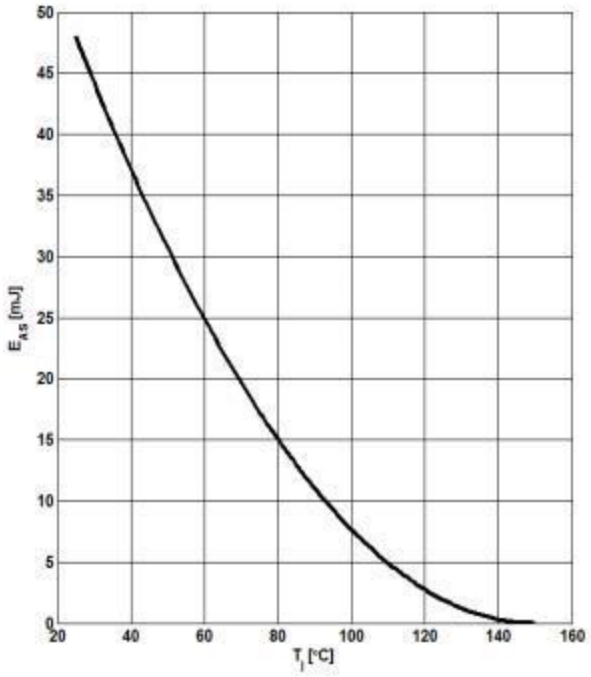
$V_{BR(DSS)}$=f(Tj); I_D= 1mA

Figure 14: Forward Characteristics of Reverse Diode



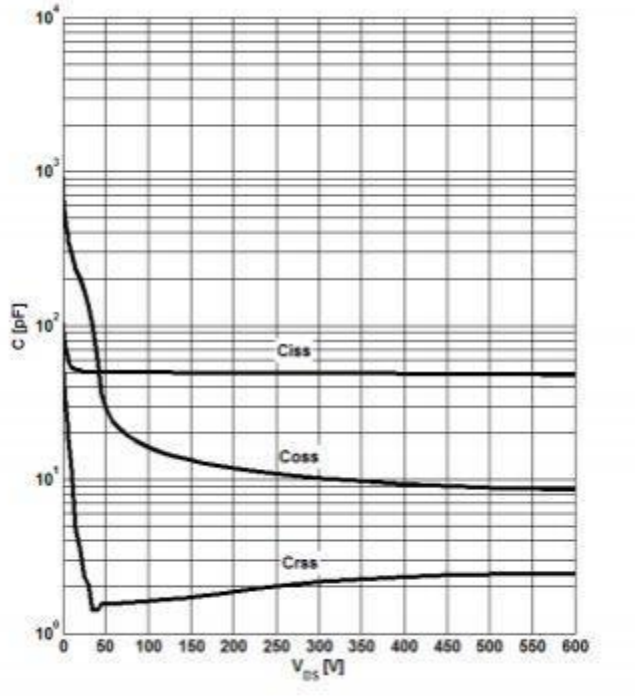
I_F=f(V_{SD}); parameter: Tj

Figure 15: Avalanche Energy



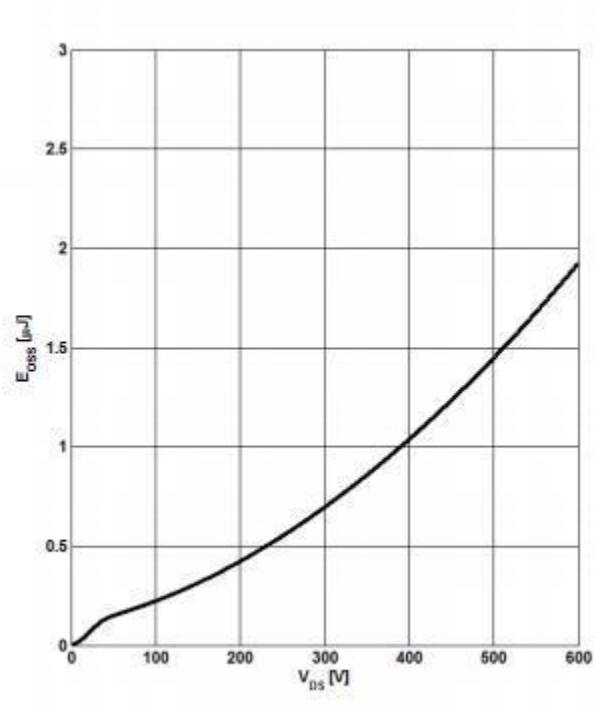
$E_{AS}=f(Tj)$; $I_D=0.9A$; $V_{DD}=60V$

Figure 16: Typ. Capacitances



$C=f(V_{DS})$; $V_{GS}=0$; $f=1MHz$

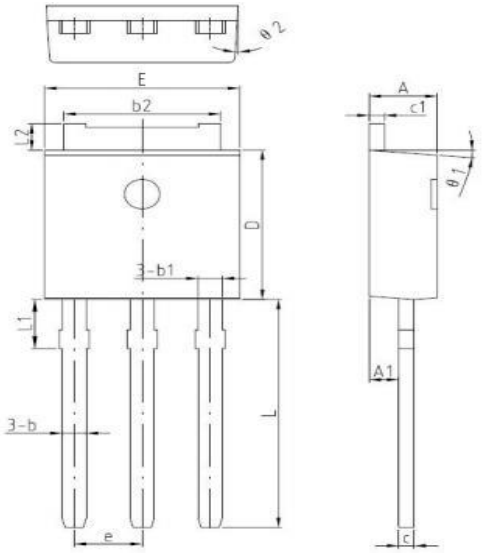
Figure 17: C_{OSS} Stored Energy



$E_{OSS}=f(V_{DS})$

Mechanical Dimensions:

TO-251 Package Information

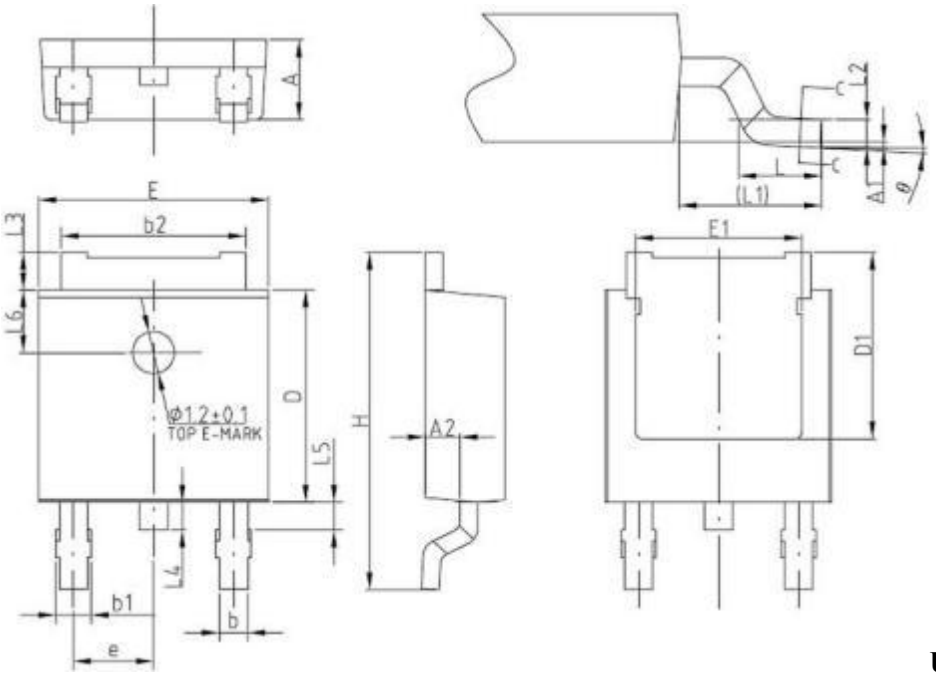


Unit: mm

Symbol	Dimensions(mm)		
	Min	Typ	Max
A	2.20	2.30	2.40
A1	0.90	1.01	1. 17
b	0.50	-	0.91
b1	-	0.81	-
b2	5. 13	5.33	5.46
c	0.46	0.50	0.60
c1	0.46	0.50	0.60
D	5.95	6. 10	6.25
E	6.45	6.60	6.75
e	2.286(BSC)		
L	9.00	9.30	9.60
L1	-	2.00	-
L2	0.90	-	1.25
θ1	-	5°	-
θ2	-	3°	-

Mechanical Dimensions:

TO-252 Package Information

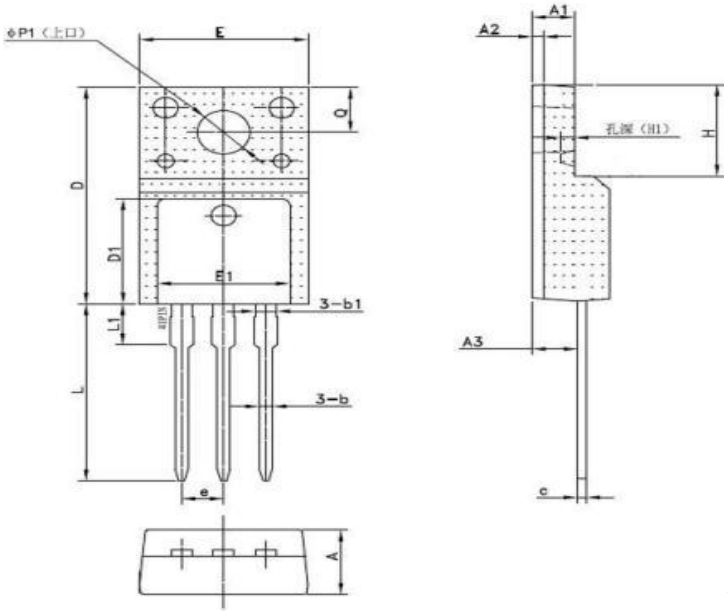


Unit: mm

Symbol	Dimensions(mm)		
	Min	Typ	Max
A	2.20	2.30	2.40
A1	0	-	0. 10
A2	0.90	1.00	1. 17
b	0.70	0.76	0.90
b1	0.77	-	1. 10
b2	5. 13	5.33	5.46
c	0.45	-	0.60
D	5.95	6. 10	6.25
D1	-	5.30	-
E	6.45	6.60	6.75
E1	-	4.80	-
e	2.286(BSC)		
H	9.70	10. 10	10.40
L	1.25	1.50	1.75
L1	-	2.90	-
L2	-	0.51	-
L3	0.90	-	1.25
L4	-	0.80	-
L5	-	1.00	-
L6	-	1.80	-
θ	0°	-	8°

Mechanical Dimensions:

TO-220F Package Information



Unit: mm

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

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