



650V/20A N-Channel Super Junction Power MOSFET

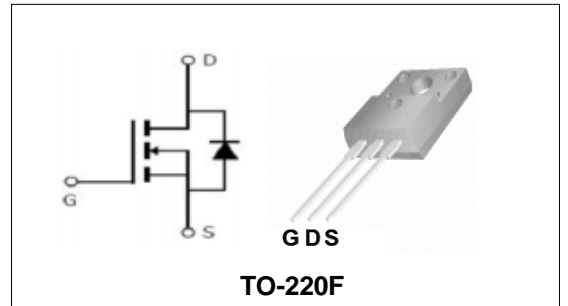
Features

- Ultra Low Gate Charge cause lower driving requirements
- 100% Avalanche Tested

Applications

- Power factor correction (PFC)
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply (UPS)

V_{DS}	650	V
I_D	20	A
$R_{DS(on),Typ} @V_{GS}=10V$	145	mΩ



Order Information

Product	Package	Marking	Tube	Carton
PJF65R180	TO-220F	PJF65R180	50PCS	5000PCS

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
Common Ratings (TC=25°C Unless Otherwise Noted)			
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650	V
V_{GS}	Gate-Source Voltage	±30	V
T_J	Maximum Junction Temperature	150	°C
T_{STG}	Storage Temperature Range	-55 to 150	°C
I_S	Diode Continuous Forward Current	$T_C=25^\circ C$ 20	A
Mounted on Large Heat Sink			
E_{AS}	Single Pulse Avalanche Energy (Note1)	210	mJ
I_{DM}	Pulse Drain Current Tested (Note2)	$T_C=25^\circ C$ 80	A
I_D	Continuous Drain current	$T_C=25^\circ C$ 20	A
P_D	Maximum Power Dissipation	$T_C=25^\circ C$ 27	W
$R_{\theta JC}$	Thermal Resistance Junction-to-Case	4.63	°C/W

**650V/20A N-Channel Super Junction Power MOSFET**

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain- Source Breakdown Voltage	V _{GS} =0V I _D =250μA	650	--	--	V
I _{DSS}	Zero Gate Voltage Drain current	V _{DS} =650V, V _{GS} =0V	--	--	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±30V, V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	3	--	4	V
R _{DS(ON)}	Drain-Source On-State Resistance (Note3)	V _{GS} =10V, I _D =10A	--	145	180	mΩ
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated) (Note4)						
C _{iss}	Input Capacitance	V _{DS} =100V,	--	1114	--	pF
C _{oss}	Output Capacitance	V _{GS} =0V,	--	68	--	pF
C _{rss}	Reverse Transfer Capacitance	F=1MHz	--	0.9	--	pF
Q _g	Total Gate Charge	V _{DS} =480V,	--	36	--	nC
Q _{gs}	Gate-Source Charge	I _D =10A,	--	7.9	--	nC
Q _{gd}	Gate-Drain Charge	V _{GS} =10V	--	18	--	nC
R _g	Gate resistance	F=1MHz	--	22	--	Ω
Switching Characteristics (Note4)						
t _{d(on)}	Turn-on Delay Time	V _{DD} =400V,	--	23	--	ns
t _r	Turn-on Rise Time	I _D =10A,	--	34	--	ns
t _{d(off)}	Turn-off Delay Time	R _G =5Ω	--	124	--	ns
t _f	Turn-off Fall Time	V _{GS} =10V	--	30	--	ns
Source- Drain Diode Characteristics @ T_j = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _S =10A, V _{GS} =0V	--	--	1.1	V
t _{rr}	Reverse Recovery Time	V _{DS} =400V, I _S =10A,	--	348	--	ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	--	5.6	--	uC

Note:

- Limited by T_{Jmax}, starting T_J = 25° C, R_G = 25Ω, V_D =60V, V_{GS} =10V. Part not recommended for use above this value.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Pulse Test: pulse width ≤ 300 us, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.



650V/20A N-Channel Super Junction Power MOSFET

Typical Characteristics

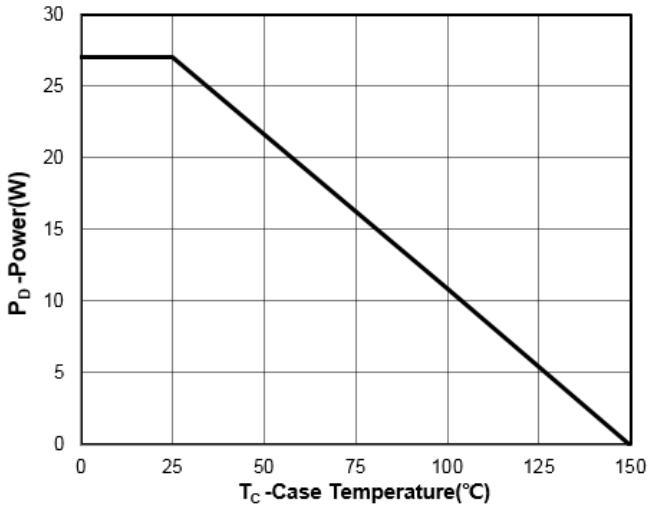


Figure1: Power De-rating

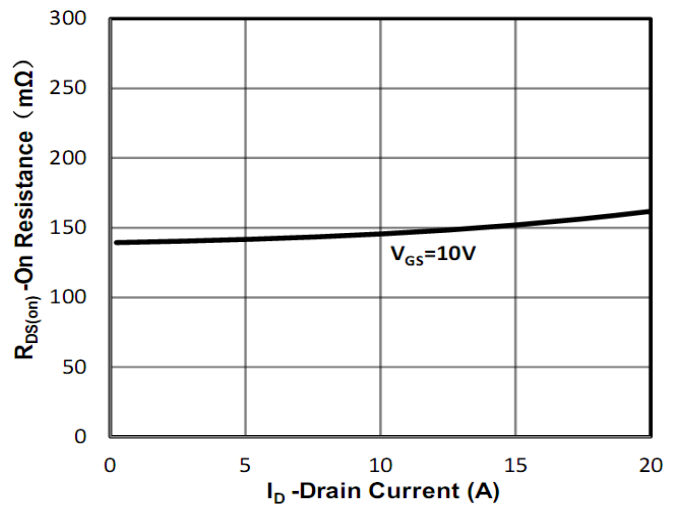


Figure2: R_{DS(on)} - Drain Current

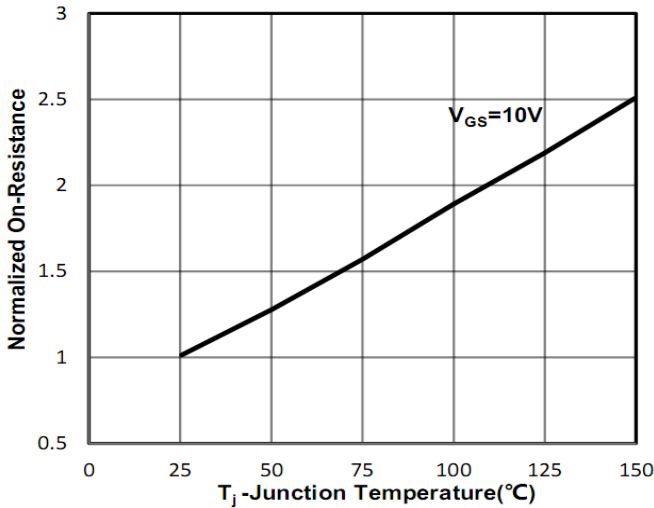


Figure3: R_{DS(on)} - Junction Temperature

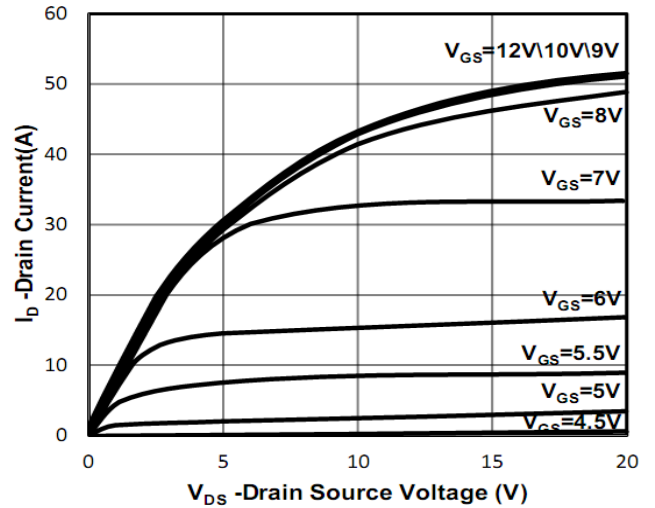


Figure4: Output Characteristics

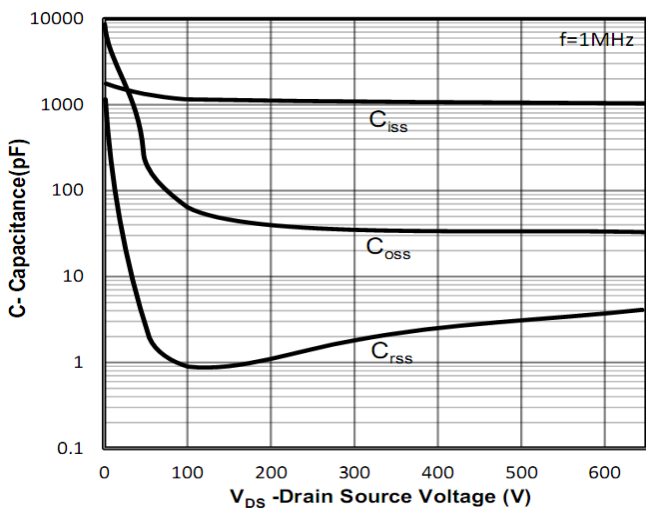


Figure5: Capacitance - V_{DS}

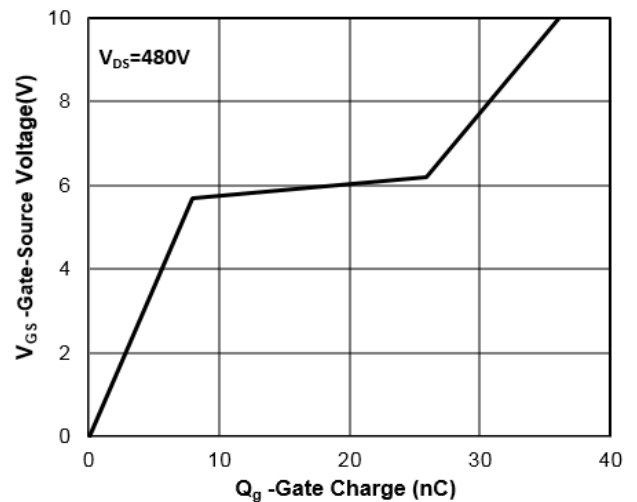


Figure6: Gate Charge



650V/20A N-Channel Super Junction Power MOSFET

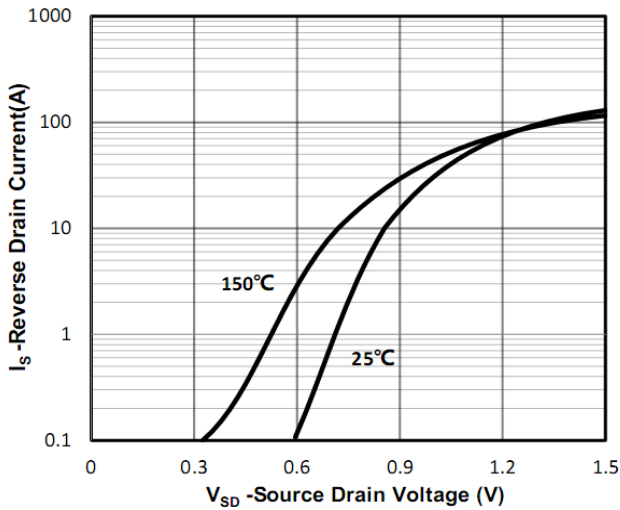


Figure7: Source-Drain Diode Forward

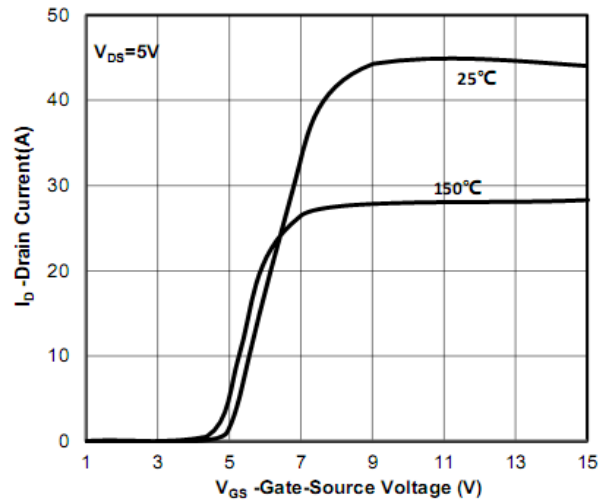


Figure8: Transfer Characteristics

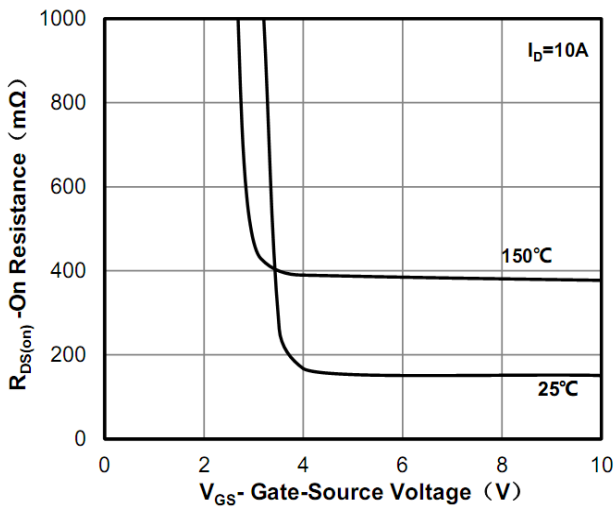


Figure9: $R_{DS(on)}$ - V_{GS}

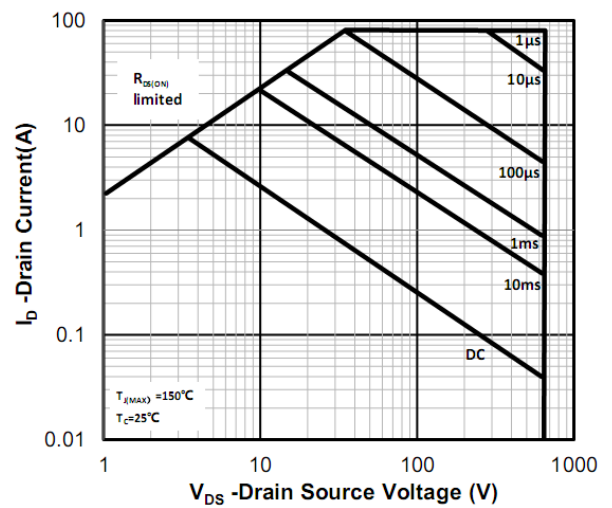


Figure10: Safe Operation Area

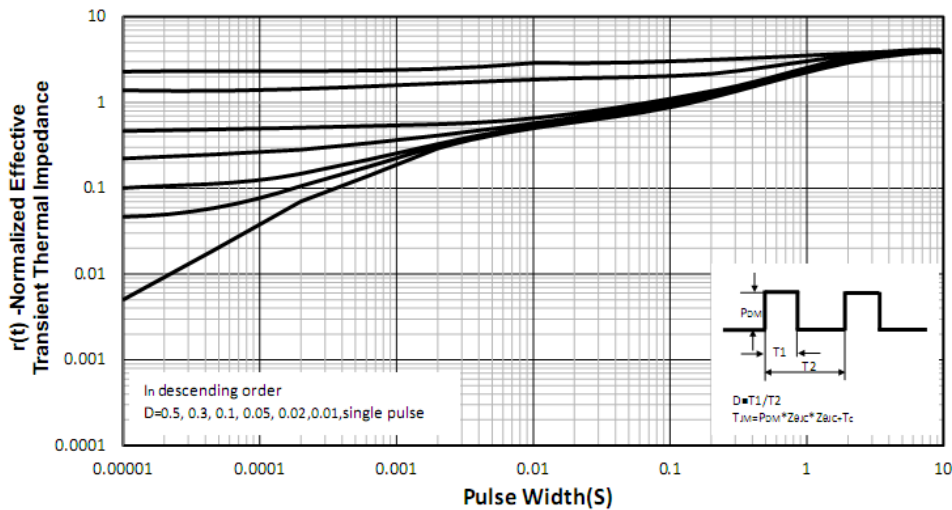


Figure11: Normalized Maximum Transient Thermal Impedance

650V/20A N-Channel Super Junction Power MOSFET

Test Circuit and Waveform:

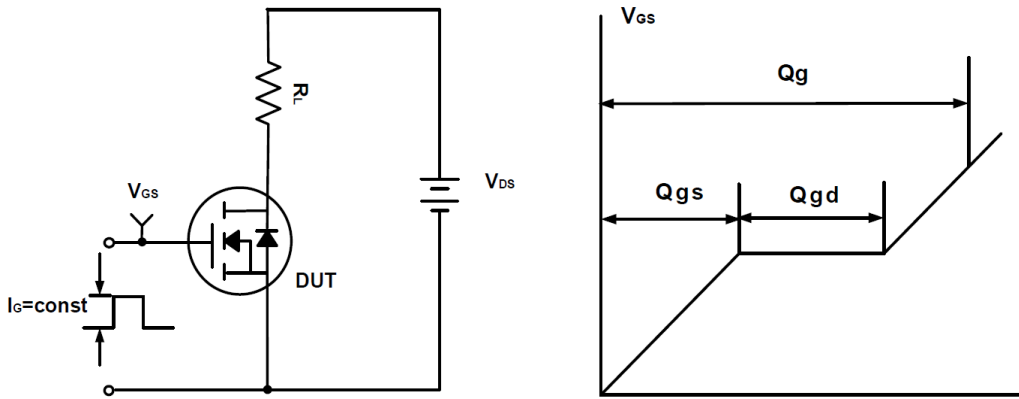


Figure A Gate Charge Test Circuit & Waveforms

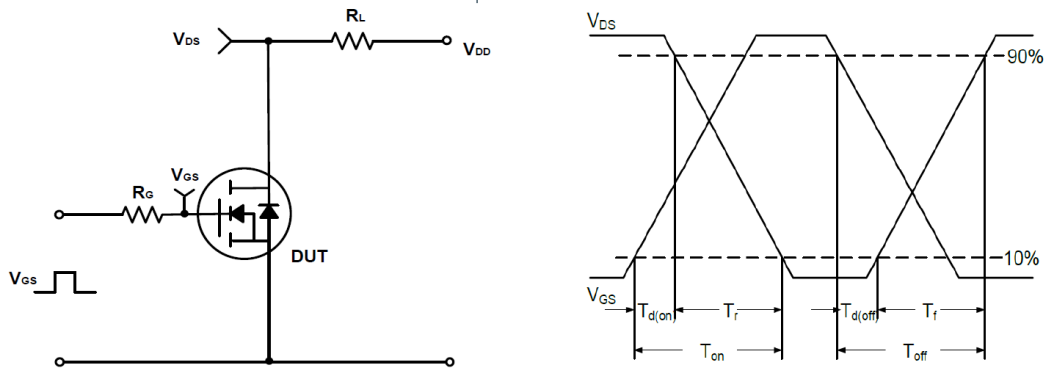


Figure B Switching Test Circuit & Waveforms

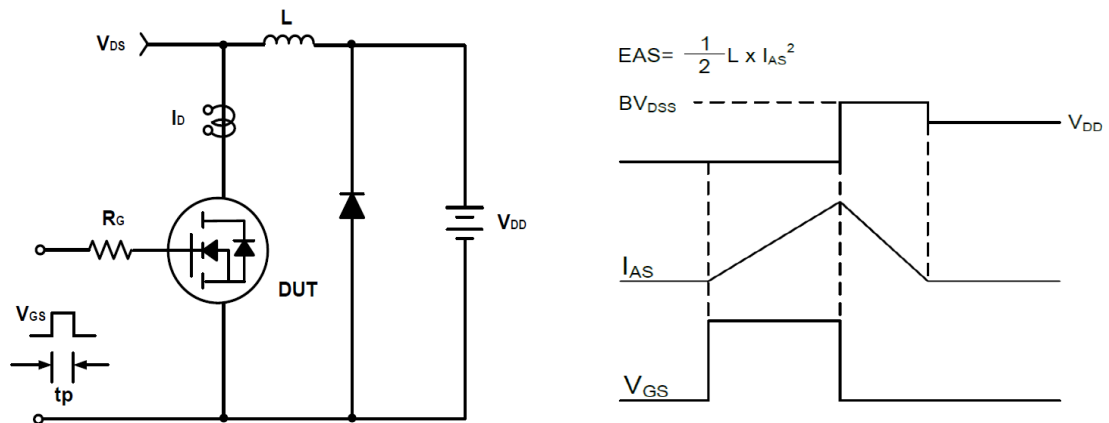
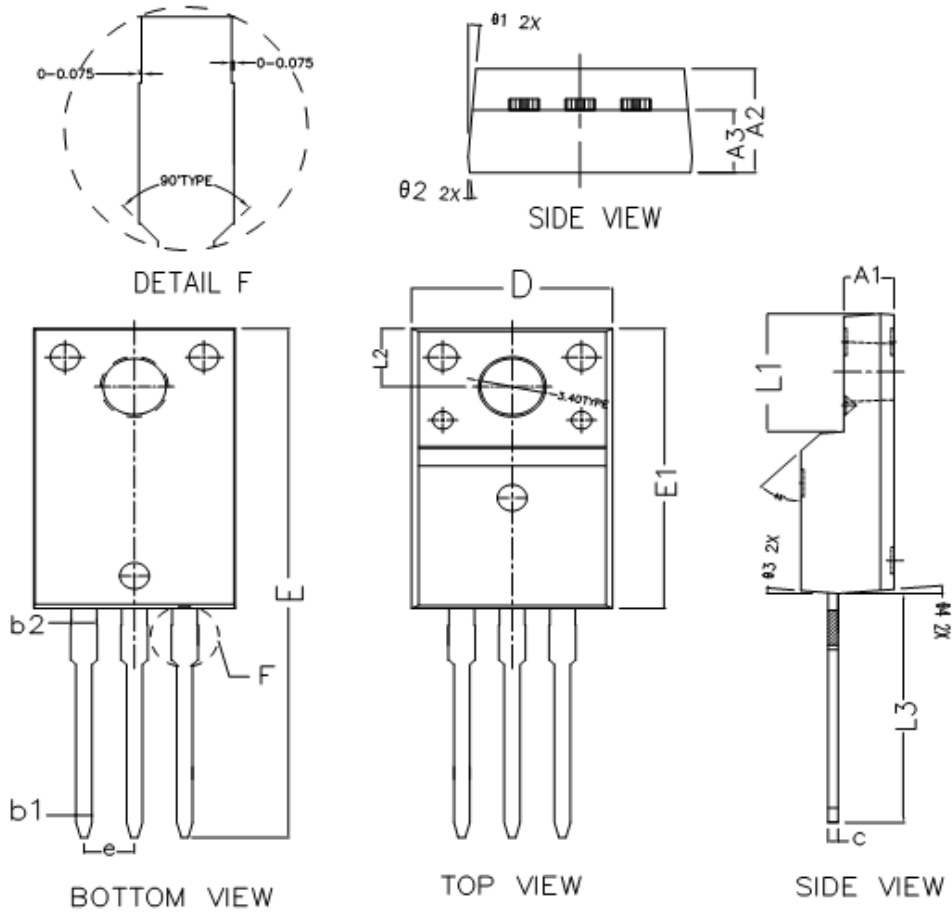


Figure C Unclamped Inductive Switching Circuit & Waveforms

650V/20A N-Channel Super Junction Power MOSFET

TO-220F Package Outline Dimensions (Units: mm)



COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A1	2.440	2.540	2.640
A2	4.600	4.700	4.800
A3	2.730	2.830	2.930
b1	0.750	0.800	0.850
b2	1.230	1.280	1.330
c	0.450	0.500	0.550
D	10.060	10.160	10.260
E	28.650	28.850	29.050
E1	15.770	15.870	15.970
e	2.54TYPE		
L1	6.68REF		
L2	3.30REF		
L3	12.830	12.980	13.130
$\theta 1$	5° TYPE		
$\theta 2$	5° TYPE		
$\theta 3$	5° TYPE		
$\theta 4$	5° TYPE		