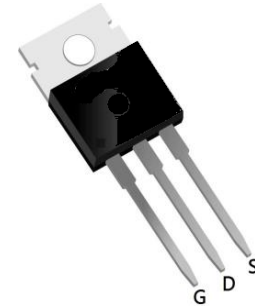## N-Ch 100 V Fast Switching MOSFETs

Description

The IRFB4410Z 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.

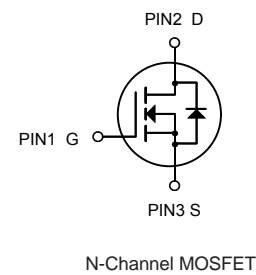### General Features

V_{DS} = 100V I_D = 70 A

$R_{DS(ON)}$ < 10.5mΩ @ V_{GS}=10V

Application

Battery protection

Load switch

Uninterruptible power supply

PIN2 D

PIN1 G

PIN3 S

N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
IRFB4410Z	TO-220	FB4410Z XXXX	50

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain CurrentTC=25 ℃	70	A
I_{DM}	PuledDrainCurrentnote1	280	A
EAS	Single Pulse Avalanche Energy[3]	110	mJ
P_D@T_C=25℃	Total Power Dissipation[4]	100	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	64	℃/W
$R_{θJC}$	Thermal Resistance Junction-Ambient [1]	1.25	℃/W

Electrical Characteristics (T$_J$=25 ℃, unless otherwise noted)

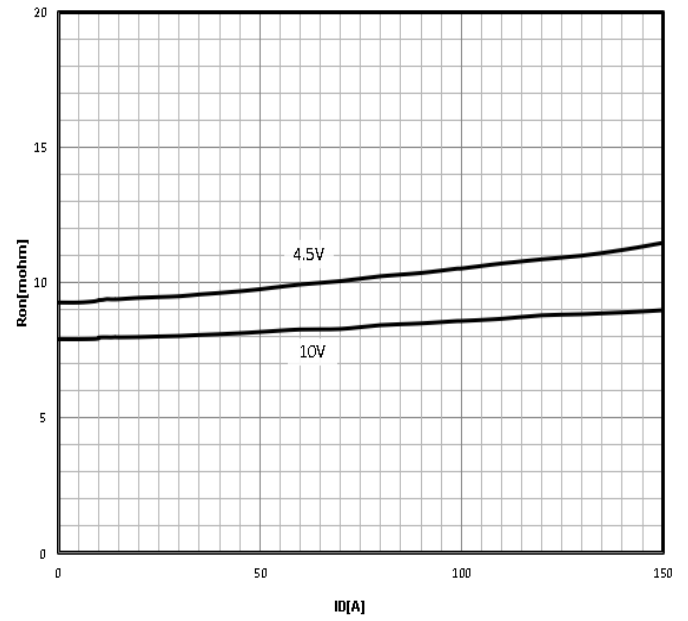| Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V , I$_D$=250uA	100	---	---	V
▢BV$_{DSS}$/▢T$_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I$_D$=1mA	---	0.098	---	V/℃
R$_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V$_{GS}$=10V , I$_D$=20A	---	8.5	10.5	m Ω
		V$_{GS}$=4.5V , I$_D$=15A	---	9.5	15	m Ω
V$_{GS(th)}$	Gate Threshold Voltage		1.0	---	2.5	V
		V$_{GS}$=V$_{DS}$, I$_D$ =250uA				
▢V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	-4.57	---	mV/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=80V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=80V , V$_{GS}$=0V , T$_J$=55℃	---	---	5	
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
R$_g$	Gate Resistance	V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz	---	0.48	---	Ω
Q$_g$	Total Gate Charge (10V)		---	31.3	---	nC
Q$_{gs}$	Gate-Source Charge	V$_{DS}$=50V , V$_{GS}$=50V , I$_D$=10A	---	3.49	---	
Q$_{gd}$	Gate-Drain Charge		---	7.63	---	
T$_{d(on)}$	Turn-On Delay Time		---	16	---	ns
T$_r$	Rise Time	V$_{DD}$=50V , V$_{GS}$=10V , R$_G$=4 Ω I$_D$=10A	---	10	---	
T$_{d(off)}$	Turn-Off Delay Time		---	40	---	
T$_f$	Fall Time		---	6	---	
C$_{iss}$	Input Capacitance		---	1368	---	pF
C$_{oss}$	Output Capacitance	V$_{DS}$=50V , V$_{GS}$=0V , f=1MHz	---	451	---	
C$_{rss}$	Reverse Transfer Capacitance		---	12.9	---	
I$_S$	Continuous Source Current[1,5]	V$_G$=V$_D$=0V , Force Current	---	---	70	A
I$_{SM}$	Pulsed Source Current[2,5]		---	---	280	A
V$_{SD}$	Diode Forward Voltage[2]	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	1.2	V
t$_{rr}$	Reverse Recovery Time	I$_F$=10A , dI/dt=100A/μs , T$_J$=25℃	---	103	---	nS
Q$_{rr}$	Reverse Recovery Charge		---	187	---	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 ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=11A

4.The power dissipation is limited by 150℃ junction temperature

5 .The data is theoretically the same as I$_D$ and I$_{DM}$, in real applications , should be limited by total power dissipation.
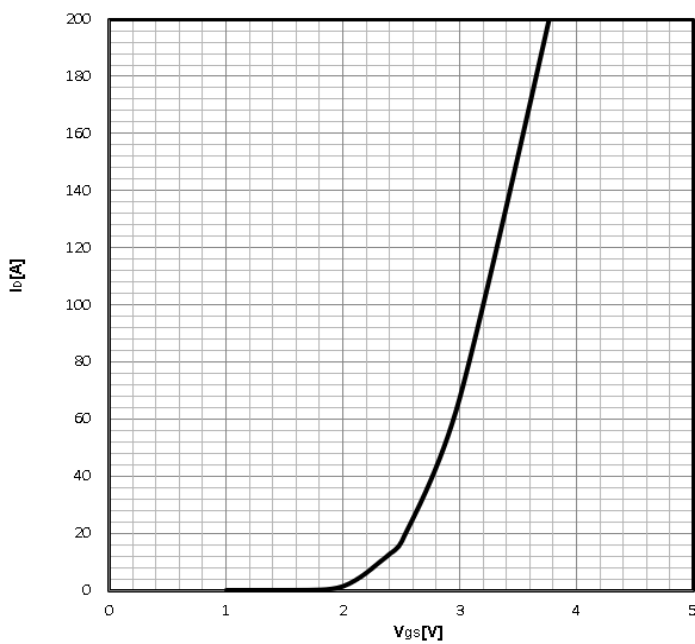
Typical Characteristics
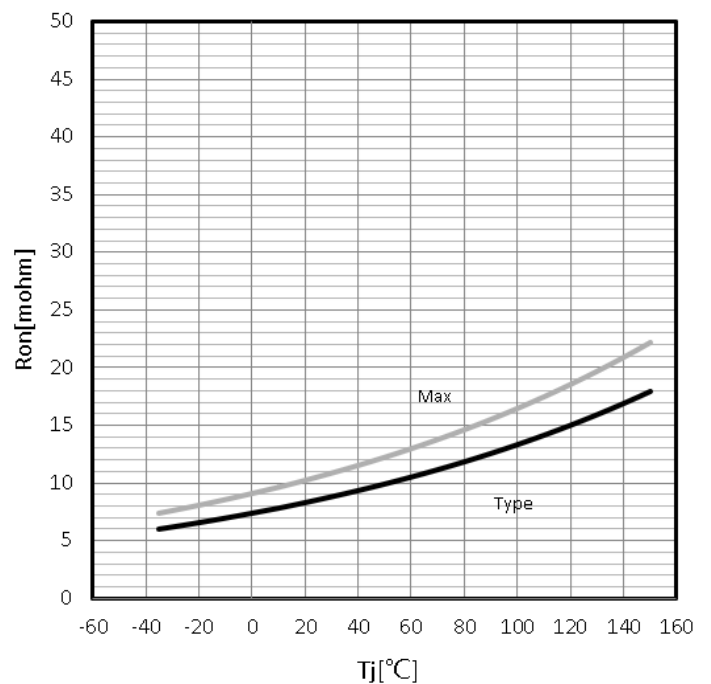
Typ. output characteristics
$I_D=f(V_{DS})$

Typ. drain-source on resistance
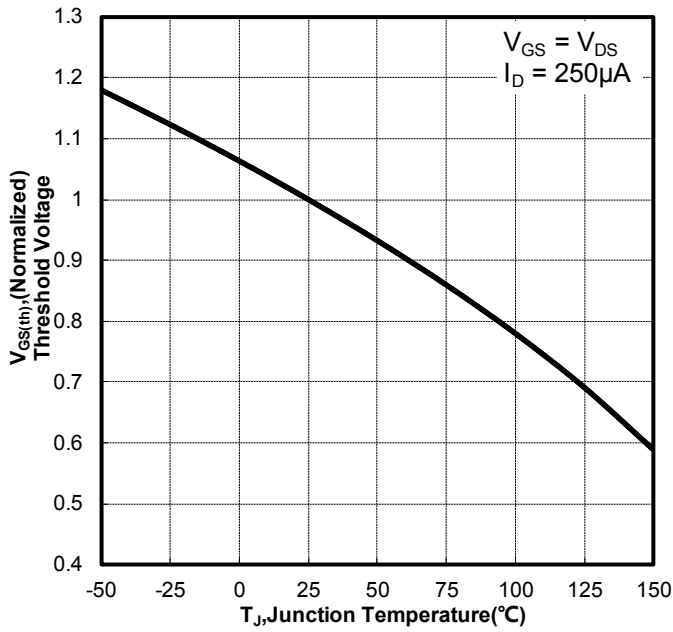$R_{DS(on)}=f(I_D)$

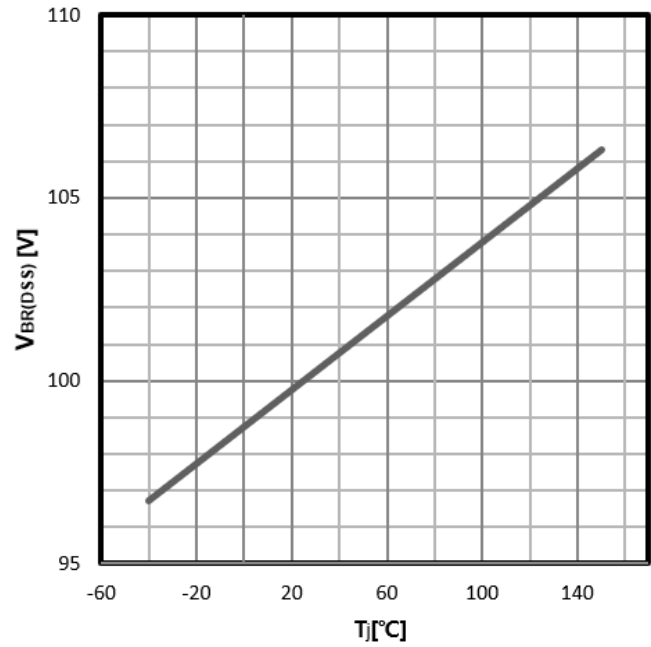

Typ. transfer characteristics
$I_D=f(V_{GS})$

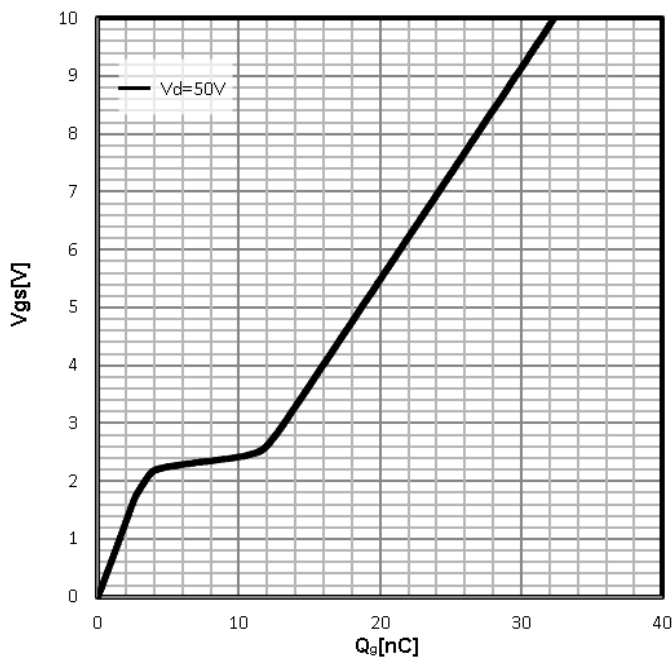**Drain-source on-state resistance**
$R_{DS(on)}=f(T_j); I_D=20A; V_{GS}=10V$
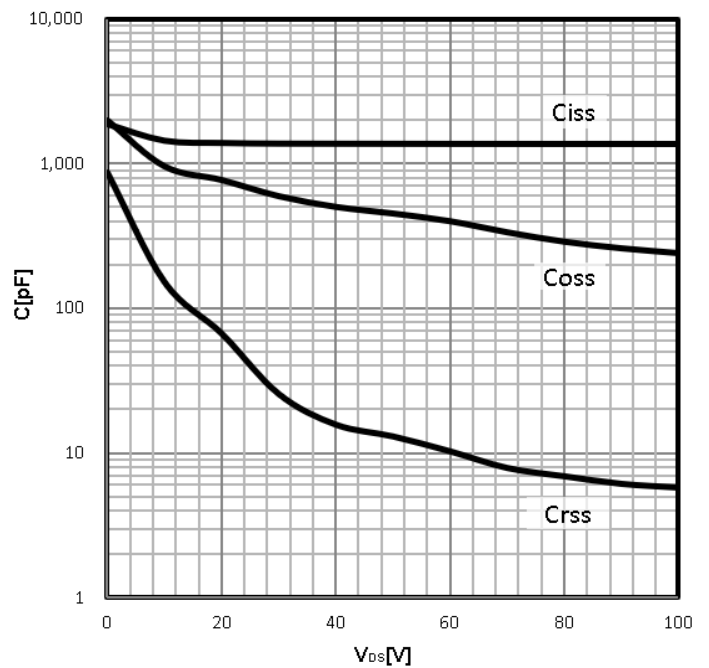
Gate Threshold Voltage
$V_{TH}=f(T_j)$; I_D=250uA

Drain-source breakdown voltage
$V_{BR(DSS)}=f(T_j)$; I_D=250uA
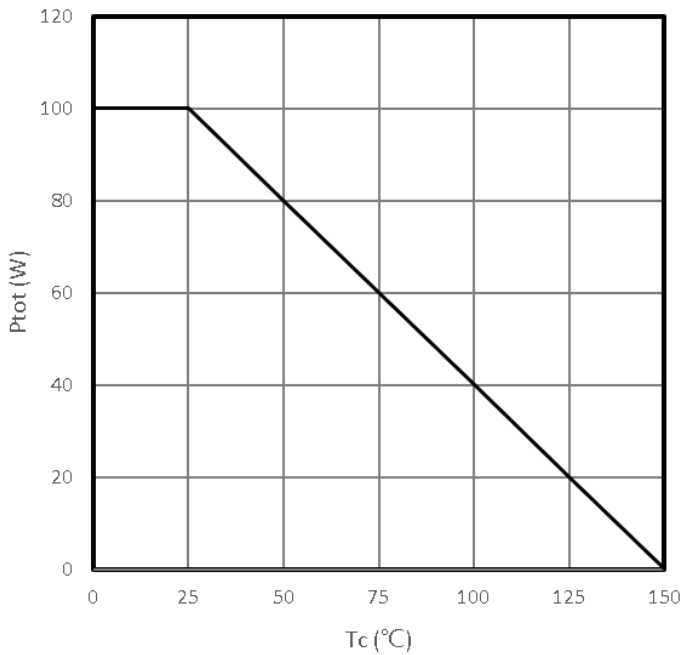

Typ. gate charge
$V_{GS}=f(Q_g)$; I_D=10A

Typ. capacitances
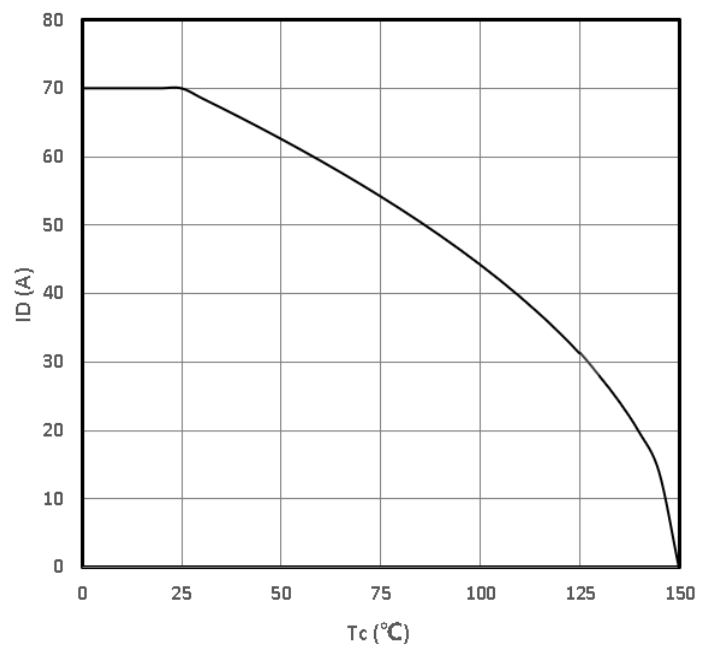$C=f(V_{DS})$; V_{GS}=0V; f =1MHz

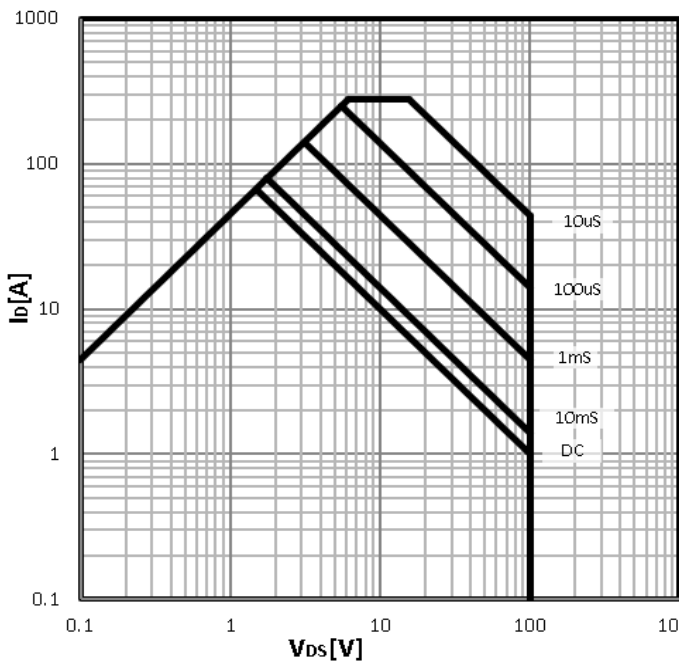**N-Ch 100 V Fast Switching MOSFETs**

Power Dissipation
$P_{tot}=f(T_C)$

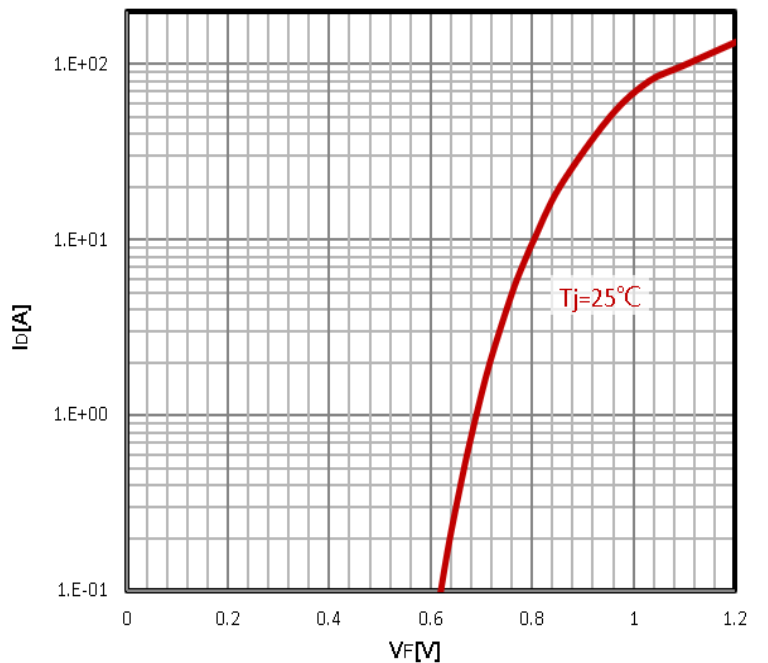## Maximum Drain Current
$I_D=f(T_C)$

Safe operating area
$I_D=f(V_{DS})$

Body Diode Forward Voltage Variation
$I_F=f(V_{GS})$

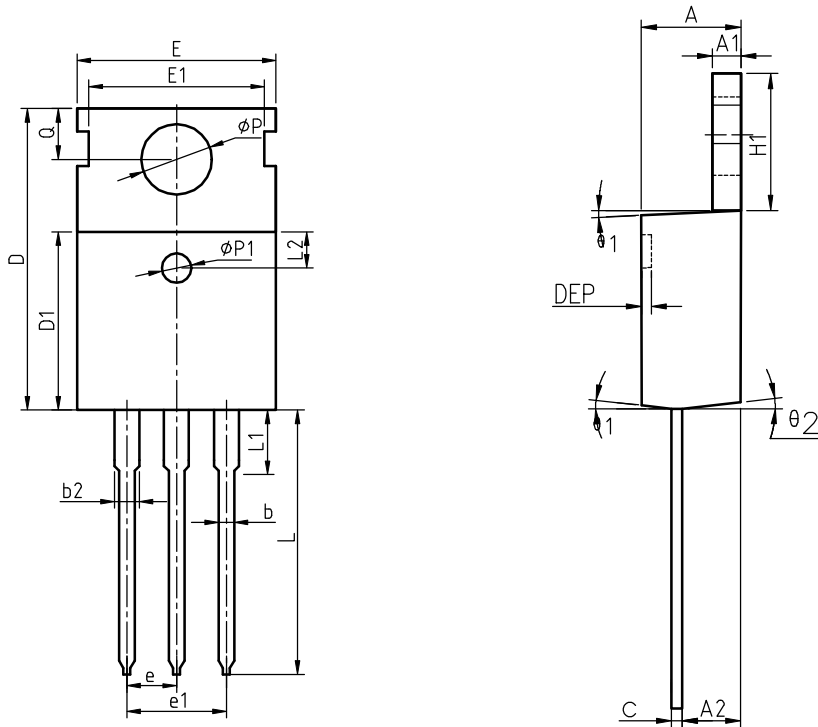## Max. transient thermal impedance

$$Z_{thJC}=f(t_p)$$

r(t), TRANSIENT THERMAL RESISTANCE

D=0.7
D=0.5
D=0.3
D=0.1
D=0.05
D=0.9
D=0.02
D=0.01
D=0.005
D=Single Pulse

$R_{\theta JC}(t) = r(t) * R_{\theta JC}$
$R_{\theta JC} = 1.1°C/W$
Duty Cycle, D = t1 / t2

Package Information

TO-220

COMMON DIMENSIONS

SYMBOL	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.27	1.30	1.33	0.050	0.051	0.052
A2	2.35	2.40	2.50	0.093	0.094	0.098
b	0.77	0.80	0.90	0.030	0.031	0.035
b2	1.17	1.27	1.36	0.046	0.050	0.054
c	0.48	0.50	0.56	0.019	0.020	0.022
D	15.40	15.60	15.80	0.606	0.614	0.622
D1	9.00	9.10	9.20	0.354	0.358	0.362
DEP	0.05	0.10	0.20	0.002	0.004	0.008
E	9.80	10.00	10.20	0.386	0.394	0.402
E1	-	8.70	-	-	0.343	-
E2	9.80	10.00	10.20	0.386	0.394	0.402
e		2.54	BSC		0.100	BSC
e1		5.08	BSC		0.200	BSC
H1	6.40	6.50	6.60	0.252	0.256	0.260
L	12.75	13.50	13.65	0.502	0.531	0.537
L1	-	3.10	3.30	-	0.122	0.130
L2		2.50	REF		0.098	REF
P	3.50	3.60	3.63	0.138	0.142	0.143
P1	3.50	3.60	3.63	0.138	0.142	0.143
Q	2.73	2.80	2.87	0.107	0.110	0.113
θ1	5°	7°	9°	5°	7°	9°
θ2	1°	3°	5°	1°	3°	5°
θ3	1°	3°	5°	1°	3°	5°