900V 9A 0.88Ω N-ch Power MOSFET

Description

DT2 MOS is DIN-TEK 2nd generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

TO-247

TO-220F

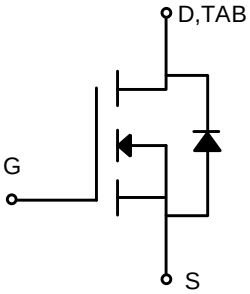
TO-220

TO-3P

Features

- Typ.$R_{DS(on)}$=0.88Ω@V_{GS}=10V
- 100% avalanche tested
- RoHS Compliant

RoHS compliant



Applications

- SMPS
- Charger
- DC-DC

Absolute Maximum Ratings (TC=25℃)

Parameter	Symbol	DTN9N90/DTR9N90	DTP9N90F	DTP9N90	Unit
Drain-source voltage	V_{DSS}	900			V
Gate-source voltage	V_{GS}	±30			V
Continuous drain current	I_D	9			A
Pulsed drain current [1]	I_{DM}	36			A
Avalanche energy, single pulse [2]	E_{AS}	245			mJ
Power dissipation	P_D	250	62.5	167	W
Derate above 25°C		2	0.5	1.3	W/℃
Operating junction temperature	T_j	-55~150			℃
Storage temperature	T_{stg}	-55~150			℃
Continuous diode forward current	I_S	9			A
Diode pulse current	I_{Spulse} [1]	36			A
Thermal resistance,junction-to-case	$R_{\theta JC}$	0.5	2	0.75	℃/W
Thermal resistance,junction-to-ambient	$R_{\theta JA}$	50	62.5	62.5	℃/W

Electrical Characteristics of MOSFET

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Drain-source break down voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	T_C=25℃	900	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250μA, V_{DS}=V_{GS}	T_J=25℃	2.5	-	4.5	V
Drain-source leakage current	I_{DSS}	V_{DS}=900V, V_{GS}=0V	T_J=25℃	-	-	1	μA
		V_{DS}=720V, V_{GS}=0V	T_J=125℃	-	-	100	μA
Gate-source leakage current,forward	I_{GSSF}	V_{DS}=0V, V_{GS}=30V	T_J=25℃	-	-	100	nA
Gate-source leakage current,reverse	I_{GSSR}	V_{DS}=0V, V_{GS}=-30V	T_J=25℃	-	-	-100	nA
Drain-source on-state resistance [3]	$R_{DS(ON)}$	V_{GS}=10V, I_D=4.5A	T_J=25℃	-	0.88	1.1	Ω
Transconductance [3]	G_{fs}	V_{DS}=10V	T_J=25℃	-	10	-	S

Dynamic Characteristics of MOSFET (TC=25℃)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	f=1MHz, V_{DS}=25V, V_{GS}=0V	-	2843	-	pF
Output capacitance	C_{oss}		-	212	-	pF
Reverse transfer capacitance	C_{rss}		-	17	-	pF
Gate to source charge	Q_{gs}	V_{DD}=450V	-	16.5	-	nC
78Gate to drain charge	Q_{gd}	I_D=9A	-	20.1	-	nC
Total gate charge	Q_g	V_{GS}= 0 to 10V	-	58.5	-	nC

Switching Characteristics of MOSFET (TC=25℃)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Turn-on delay time	$t_{d\ on}$	V_{DS}=450V, I_D=9A, R_G=25Ω, V_{GS}=0 to 10V	-	48	-	ns
Rise time	t_r		-	38	-	ns
Turn-off delay time	$t_{d\ off}$		-	158	-	ns
Fall time	t_f		-	40	-	ns

Characteristics of Body Diode (TC=25℃)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Forward voltage	V_{SD}	I_{SD}=9A, V_{GS}=0V	-	-	1.4	V
Reverse recovery time	t_{rr}	V_{DS}=450V, I_S=9A, V_{GS}=10V -di/dt=100A/μs	-	544	-	ns
Reverse recovery current	I_{rr}		-	18	-	A
Recovery charge	Q_{rr}		-	5	-	μC

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$ =150°C.
2. The E_{AS} data shows Max. rating . The test condition is V_{DD} =50V, V_{GS} =10V, L=10mH, I_{AS} =7A,Tc=25℃.
3. The data tested by pulsed , pulse width ≤ 300μs , duty cycle ≤ 2%.

TYPICAL CHARACTERISTICS

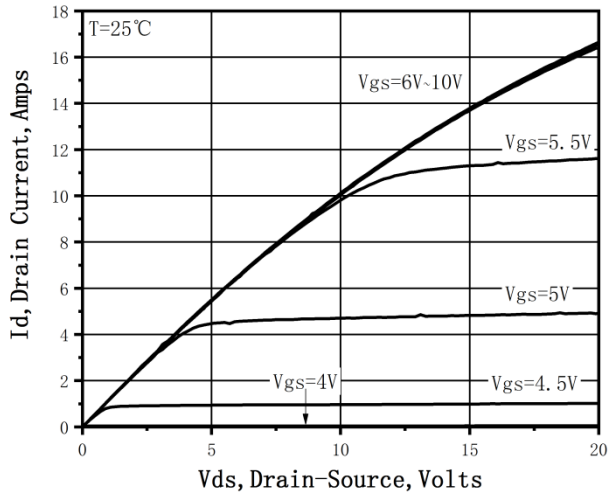


Figure 1.On-Region Characteristics

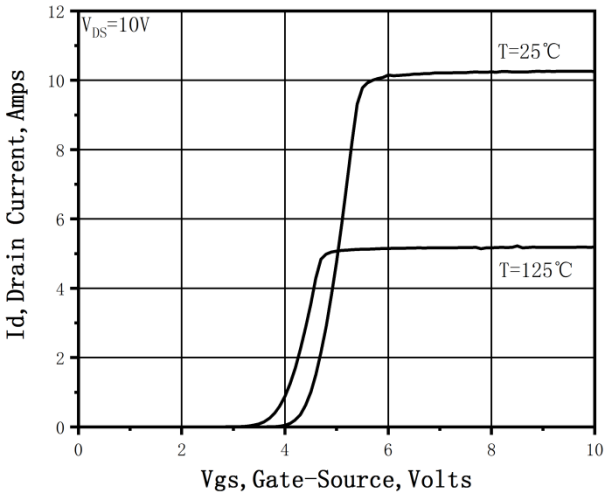


Figure 2. Transfer Characteristics

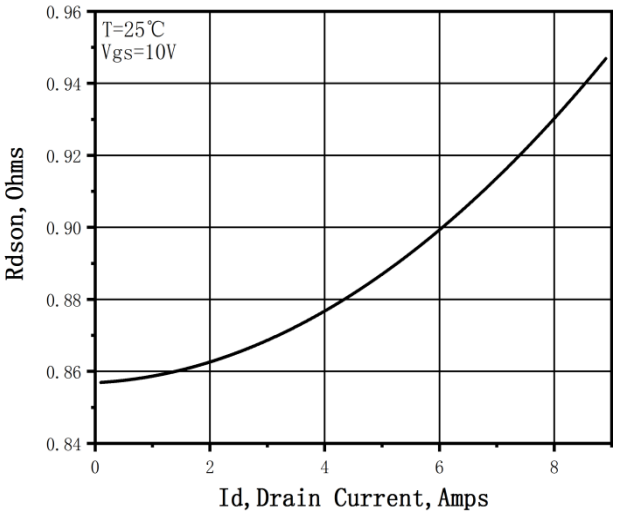


Figure 3.Static Drain-Source On Resistance

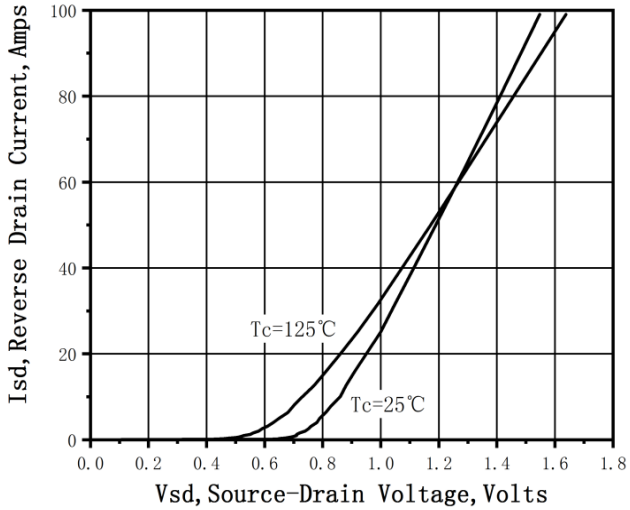


Figure 4. Typical Body Diode Transfer Characteristics

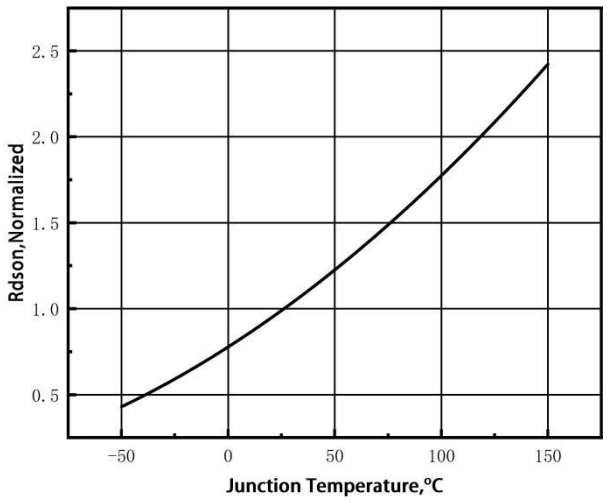


Figure 5. Normalized $R_{DS(on)}$ vs.Temperature

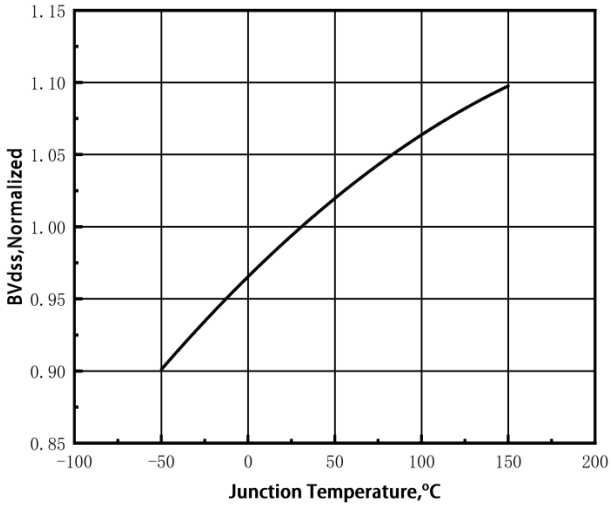


Figure 6. Normalized BV_{DSS} vs.Temperature

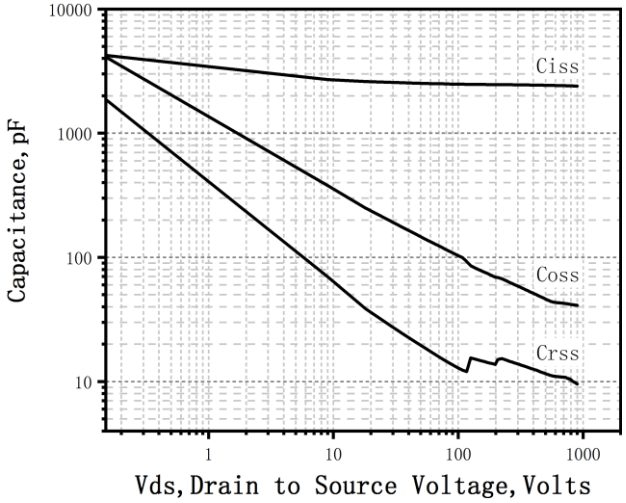


Figure 7. Capacitance Characteristics

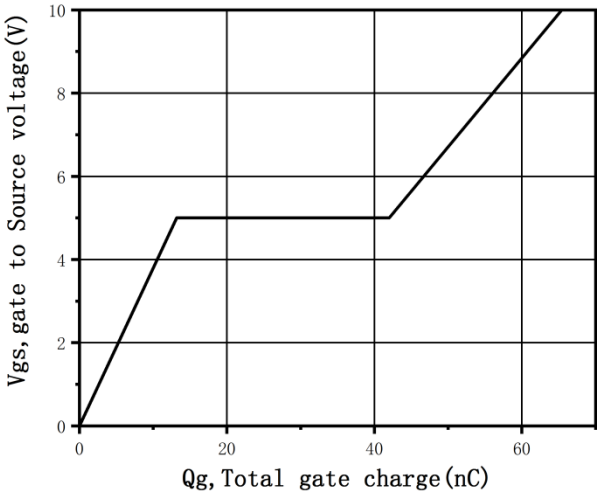


Figure 8. Gate Charge Characteristics

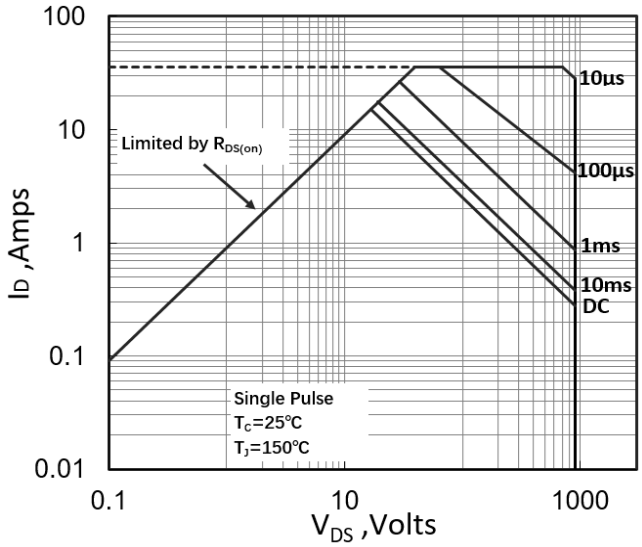


Figure 9. Maximum Safe Operating Area
(TO-247/TO-3P)

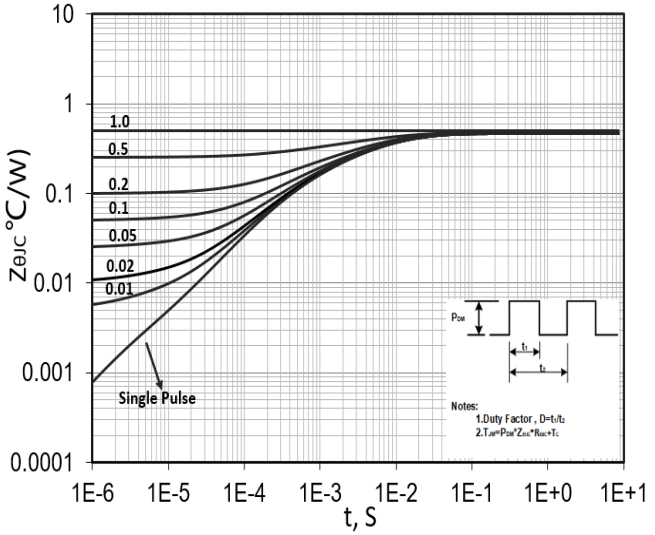


Figure 10. Transient Thermal Response Curve
(TO-247/TO-3P)

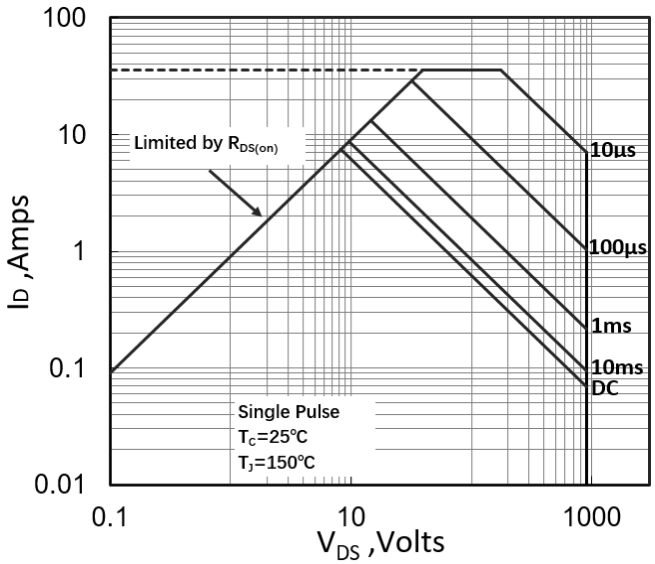


Figure 11. Maximum Safe Operating Area
(TO-220F)

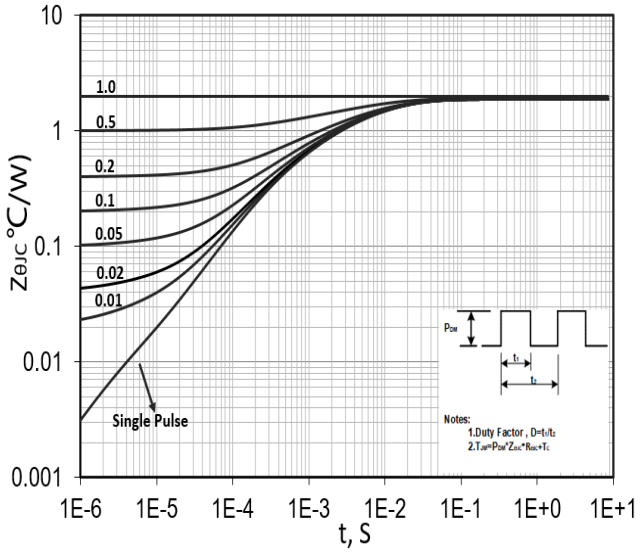


Figure 12. Transient Thermal Response Curve
(TO-220F)

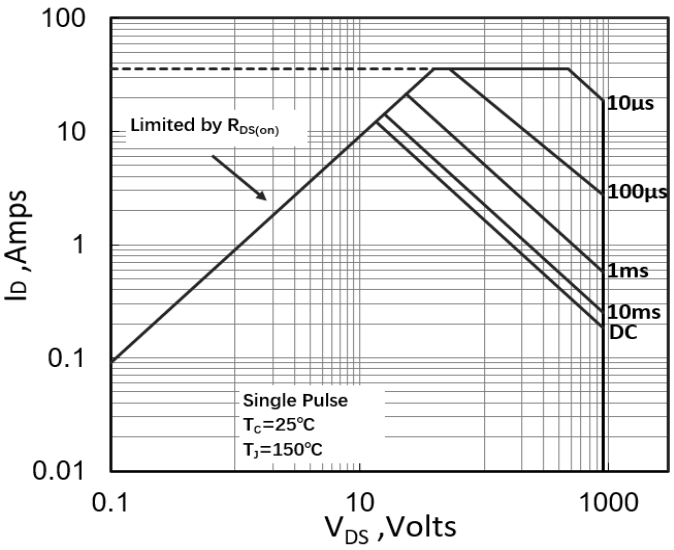


Figure 13. Maximum Safe Operating Area
(TO-220)

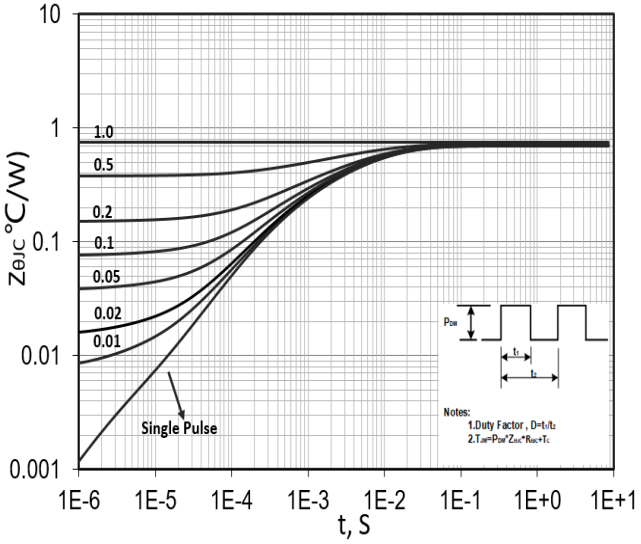
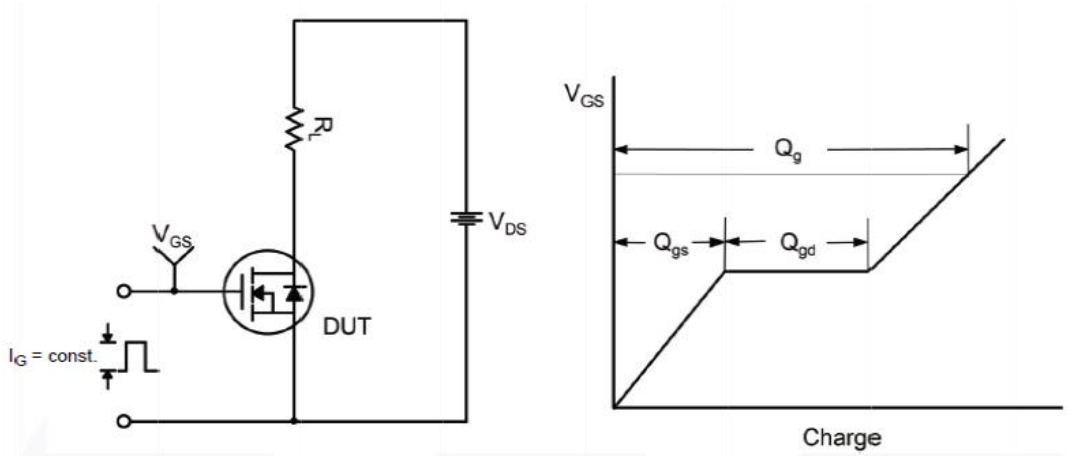


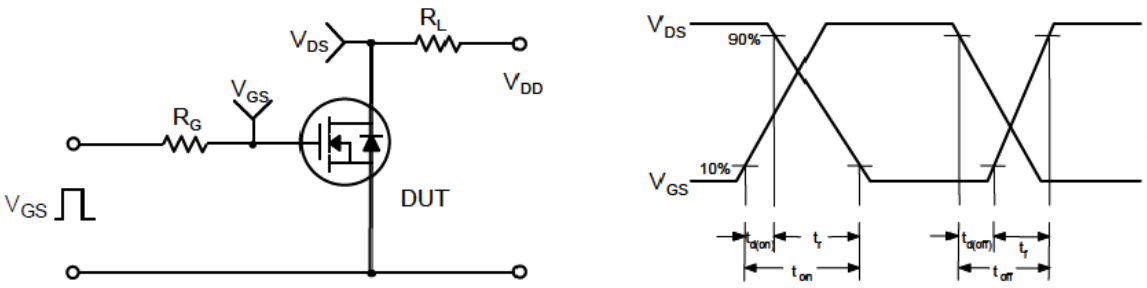
Figure 14. Transient Thermal Response Curve
(TO-220)

Test Circuit

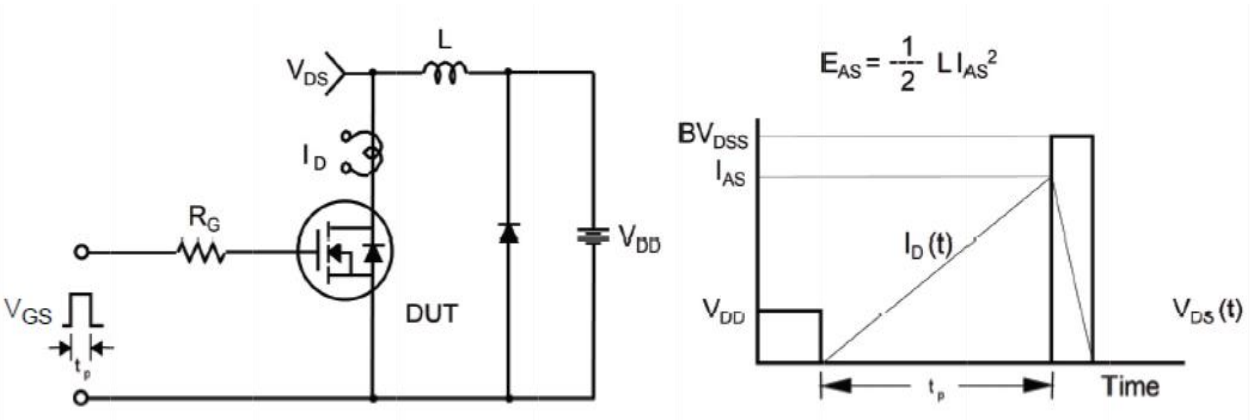
Gate Charge Test Circuit &Waveform



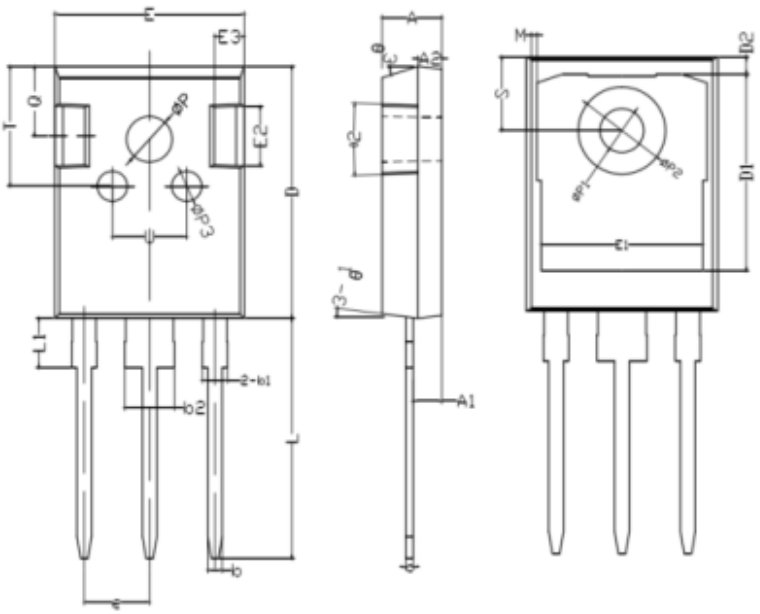
Switching Test Circuit &Waveforms



Unclamped Inductive Switching Test Circuit &Waveforms



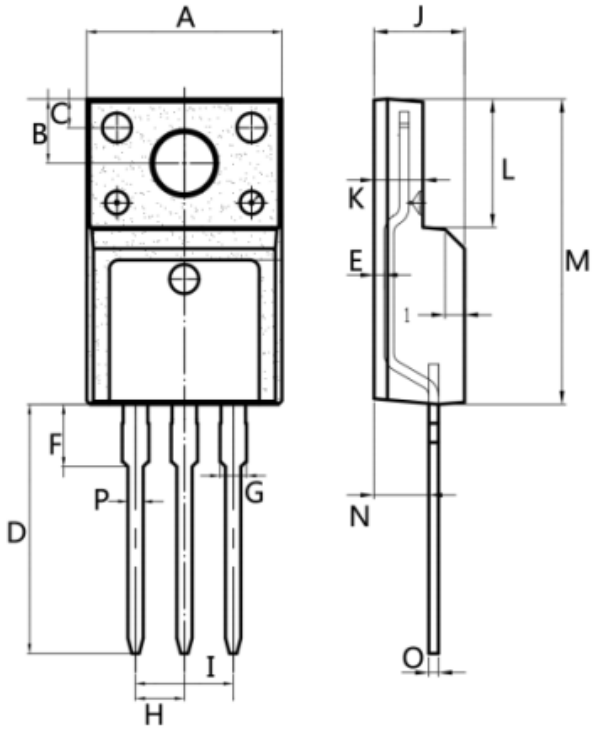
Mechanical Dimensions for TO-247



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.59
A2	1.85	2.15
b	1.11	1.36
b1	1.91	2.25
b2	2.91	3.25
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.00	13.60
E2	4.80	5.20
E3	2.30	2.70
e	5.40	5.48
L	19.62	20.22
L1	-	4.30
ØP	3.40	3.80
ØP2	6.90	7.30
S	6.05	6.25

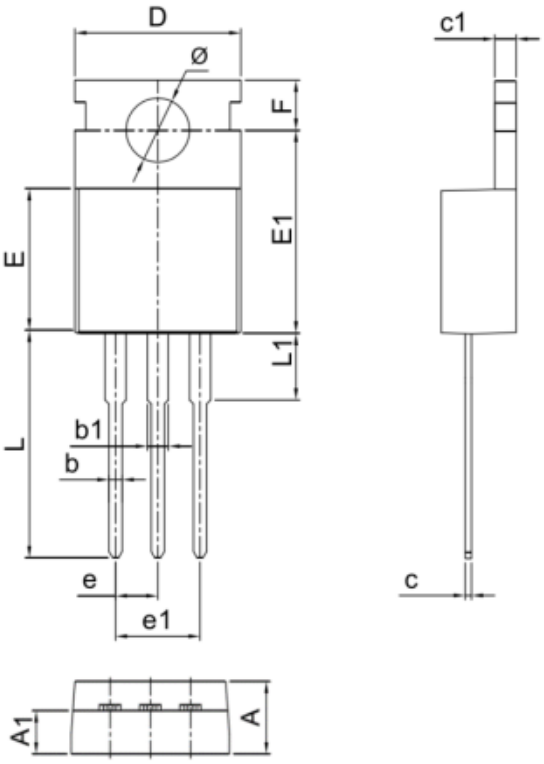
Mechanical Dimensions for TO-220F



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.95	10.36
B	2.95	3.55
C	1.25	1.6
D	12.64	13.5
E	0.40	0.60
F	2.80	3.80
G	1.14	1.58
H	2.44	2.64
I	4.88	5.26
J	4.50	4.90
K	2.34	2.80
L	6.48	6.90
M	15.40	16.07
N	2.66	3.50
O	0.40	0.64
P	0.70	0.94

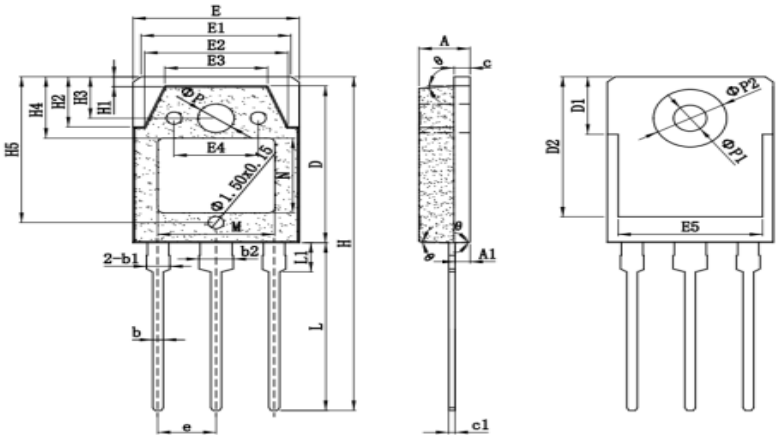
Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.30	4.70
A1	2.30	2.82
b	0.70	0.94
b1	1.17	1.41
c	0.30	0.64
c1	1.17	1.44
D	9.70	10.20
E	8.50	9.30
E1	12.00	12.50
e	2.44	2.64
e1	4.88	5.26
F	2.60	2.94
L	13.00	14.00
L1	3.385	4.20
Ø	3.74	3.95

Mechanical Dimensions for TO-3P



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.65	4.95
A1	1.40	1.60
b	0.80	1.20
b1	1.90	2.30
b2	2.90	3.30
c	1.45	1.55
c1	0.5	0.65
D	17.70	19.70
D1	6.70	7.10
D2	16.60	17.00
E	15.45	15.75
H	39.80	40.20
L	19.70	20.30
L1	3.40	3.70
M	10.85	11.15
N	8.70	9.10
e	5.40	5.48
ΦP	3.25	3.55
ΦP1	3.00	3.30
ΦP2	6.70	7.10

Ordering Information

Part	Package	Marking	Packing method	Minimum packing number
DTN9N90	TO-247	DTN9N90	Tube	30 / Tube
DTP9N90F	TO-220F	DTP9N90F	Tube	50 / Tube
DTP9N90	TO-220	DTP9N90	Tube	50 / Tube
DTR9N90	TO-3P	DTR9N90	Tube	30 / Tube

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