

650V 5A 1.9Ω N-ch Power MOSFET

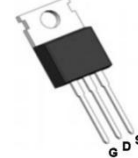
Description

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-252



TO-220



TO-220F

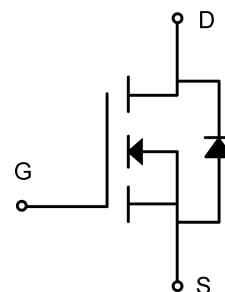


Features

- Typ. $R_{DS(on)}=1.9\Omega@V_{GS}=10V$
- 100% avalanche tested
- RoHS Compliant

Applications

- SMPS
- Charger
- DC-DC



Absolute Maximum Ratings ($T_c=25^\circ C$)

Parameter	Symbol	DTU5N65	DTP5N65	DTP5N65F	Unit
Drain-source voltage	V_{DSS}	650			V
Gate-source voltage	V_{GS}	± 30			V
Continuous drain current	I_D	5			A
Pulsed drain current ¹	I_{DM}	20			A
Avalanche energy, single pulse ²	E_{AS}	235			mJ
Power dissipation	P_D	54	100	36	W
Derate above 25°C		0.4	0.8	0.3	W/°C
Operating junction temperature	T_j	-55~150			°C
Storage temperature	T_{stg}	-55~150			°C
Continuous diode forward current	I_S	5			A
Diode pulse current ¹	I_{Spulse}	20			A
Thermal resistance,junction-to-case	$R_{\theta JC}$	2.3	1.25	3.47	°C/W
Thermal resistance,junction-to-ambient	$R_{\theta JA}$	160	62.5		°C/W

Electrical Characteristics of MOSFET

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source break down voltage	BV_{DSS}	$I_D=250\mu A$, $V_{GS}=0V$ $T_J=25^\circ C$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A$, $V_{DS}=V_{GS}$ $T_J=25^\circ C$	2	-	4	V
Drain-source leakage current	I_{DSS}	$V_{DS}=650V$, $V_{GS}=0V$ $T_J=25^\circ C$	-	-	1	μA
		$V_{DS}=520V$, $V_{GS}=0V$ $T_J=125^\circ C$	-	-	100	μA
Gate-source leakage current,forward	I_{GSSF}	$V_{DS}=0V$, $V_{GS}=30V$ $T_J=25^\circ C$	-	-	100	nA
Gate-source leakage current,reverse	I_{GSSR}	$V_{DS}=0V$, $V_{GS}=-30V$ $T_J=25^\circ C$	-	-	-100	nA
Drain-source on-state resistance ³	$R_{DS(on)}$	$V_{GS}=10V$, $I_D=2.5A$ $T_J=25^\circ C$	-	1.9	2.2	Ω

Dynamic Characteristics of MOSFET ($T_C=25^\circ C$)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz$, $V_{DS}=25V$, $V_{GS}=0V$	-	691	-	pF
Output capacitance	C_{oss}		-	57	-	pF
Reverse transfer capacitance	C_{rss}		-	4	-	pF
Gate to source charge	Q_{gs}	$V_{DD}=300V$	-	5	-	nC
Gate to drain charge	Q_{gd}	$I_D=5A$	-	3	-	nC
Total gate charge	Q_g	$V_{GS}=0$ to 10V	-	13	-	nC

Switching Characteristics of MOSFET ($T_C=25^\circ C$)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Turn-on delay time	$t_{d on}$	$V_{DS}=300V$, $I_D=5A$, $R_G=25\Omega$, $V_{GS}=0$ to 10V	-	16	-	ns
Rise time	t_r		-	18	-	ns
Turn-off delay time	$t_{d off}$		-	35	-	ns
Fall time	t_f		-	14	-	ns

Characteristics of Body Diode ($T_C=25^\circ C$)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Forward voltage	V_{SD}	$I_{SD}=5A$, $V_{GS}=0V$	-	-	1.5	V
Reverse recovery time	t_{rr}	$V_{DS}=50V$, $I_S=5A$, $V_{GS}=10V$ $-di/dt=100A/\mu s$	-	246	-	ns
Reverse recovery current	I_{rr}		-	10	-	A
Recovery charge	Q_{rr}		-	1.2	-	μC

Notes:

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

TYPICAL CHARACTERISTICS

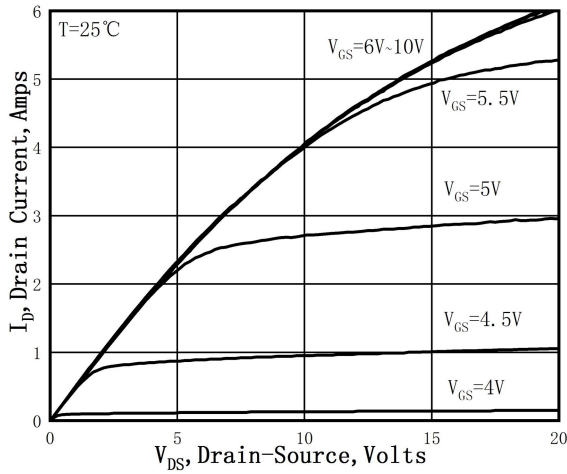


Figure 1. On-Region Characteristics

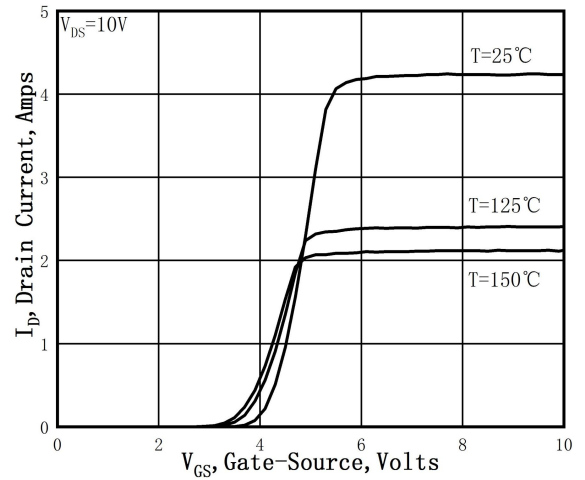


Figure 2. Transfer Characteristics

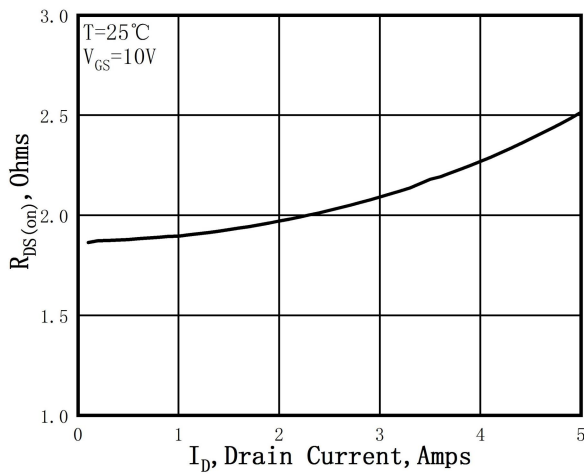


Figure 3. Static Drain-Source On Resistance

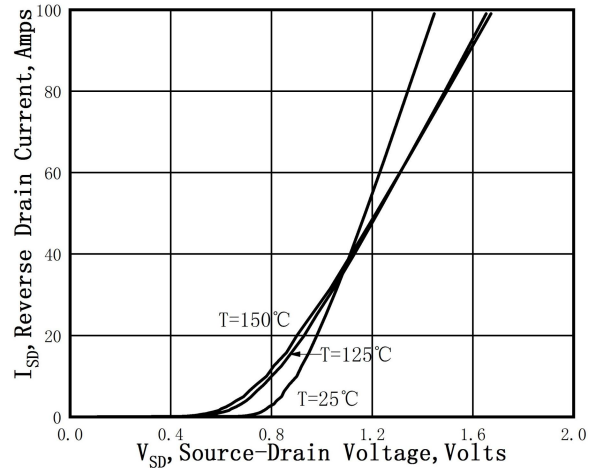


Figure 4. Typical Body Diode Transfer Characteristics

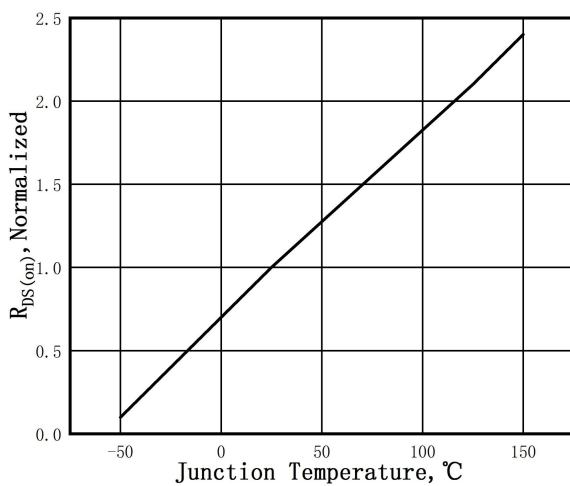


Figure 5. Normalized $R_{DS(on)}$ vs. Temperature

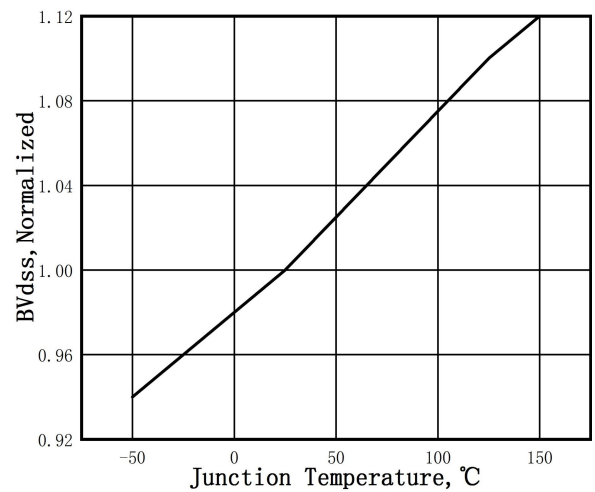


Figure 6. Normalized BV_{DSS} vs. Temperature

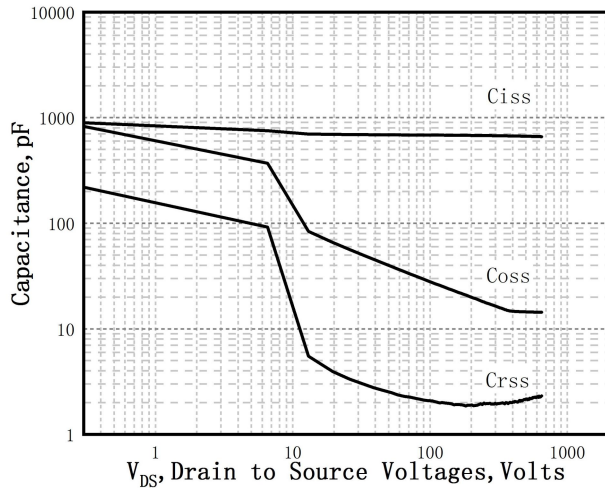


Figure 7. Capacitance Characteristics

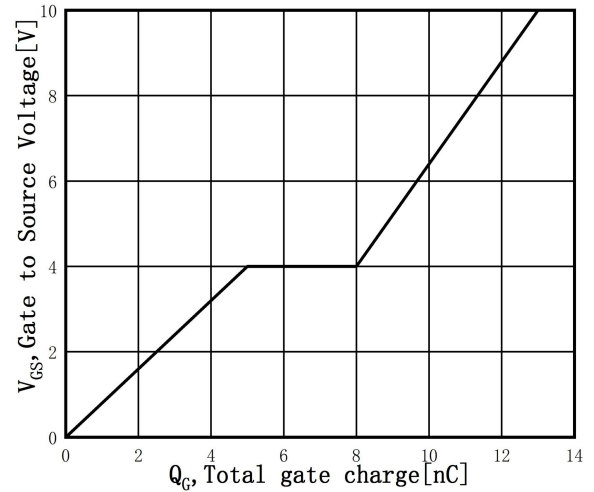


Figure 8. Gate Charge Characteristics

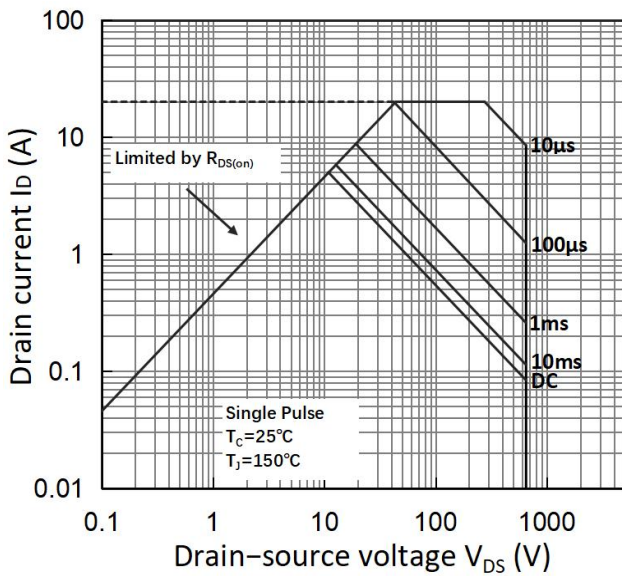


Figure 9. Maximum Safe Operating Area (TO-252)

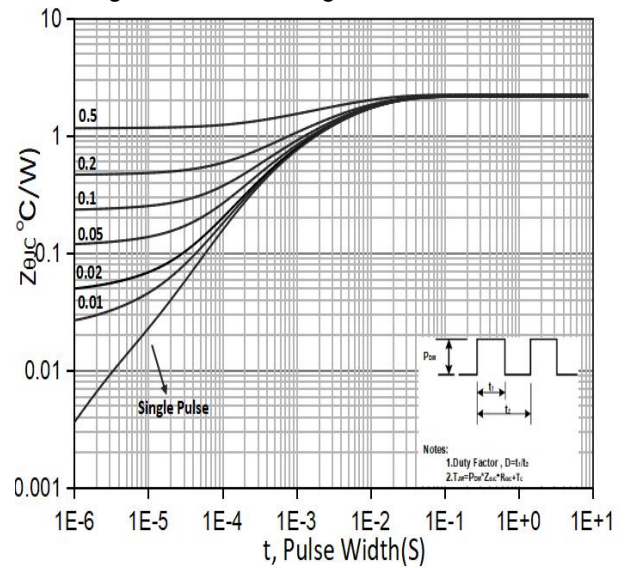


Figure 10. Transient Thermal Response Curve (TO-252)

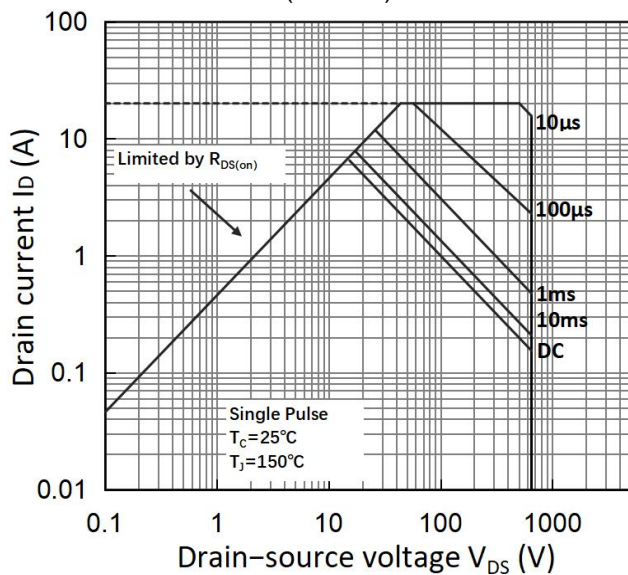


Figure 11. Maximum Safe Operating Area (TO-220)

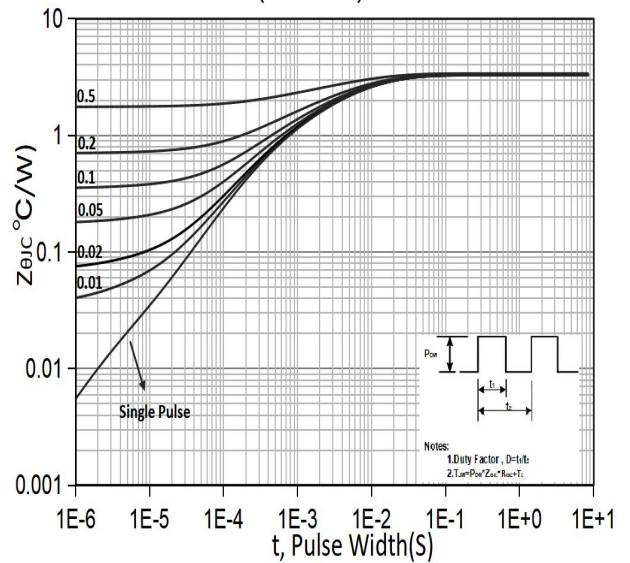


Figure 12. Transient Thermal Response Curve (TO-220)

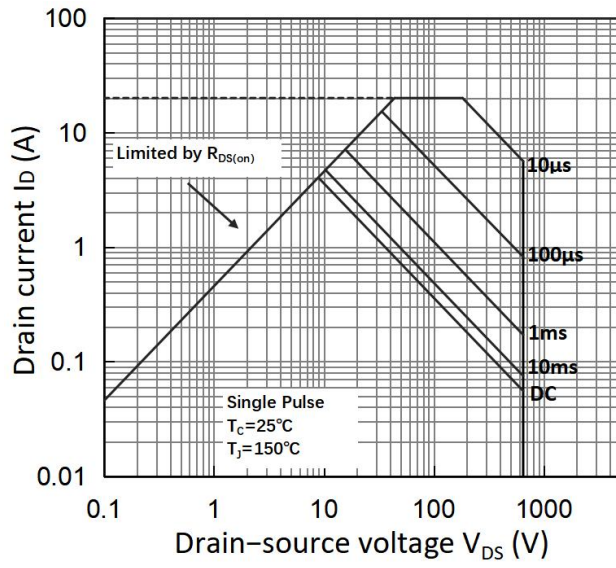


Figure 13. Maximum Safe Operating Area (TO-220F)

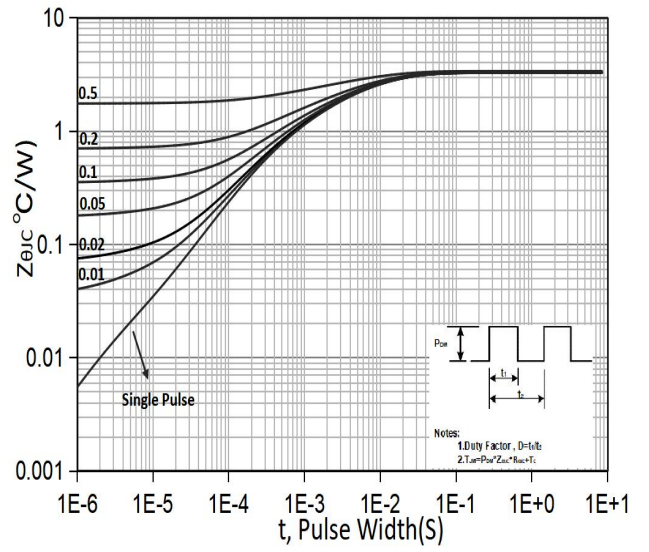
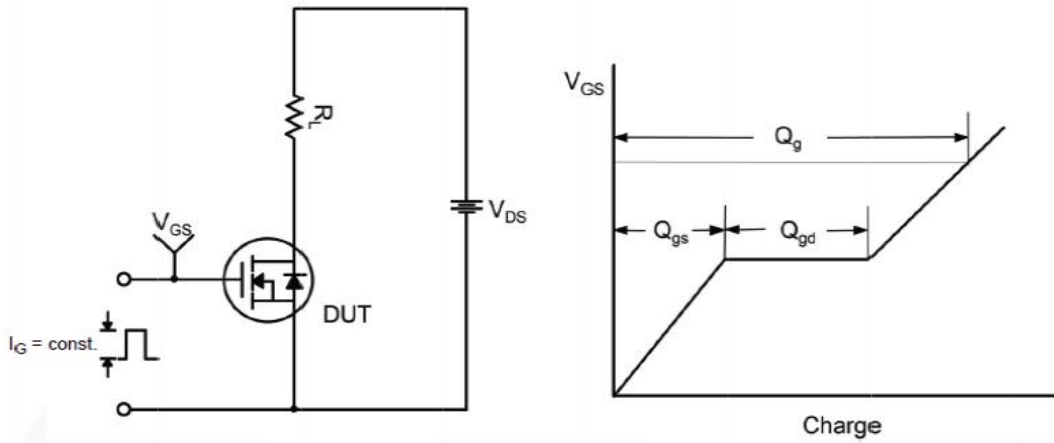


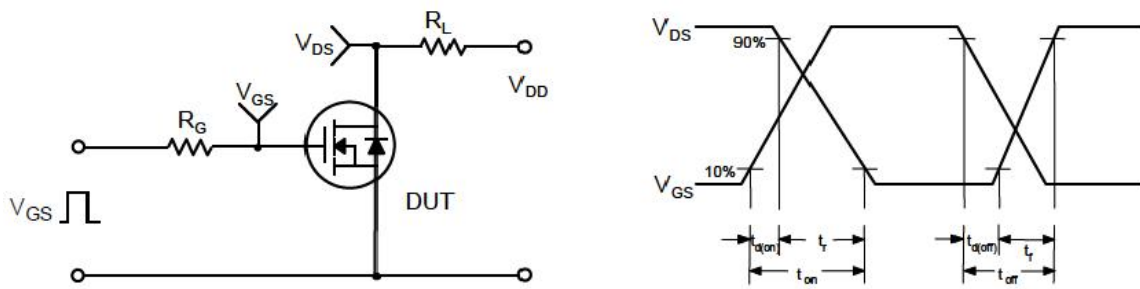
Figure 14. Transient Thermal Response Curve (TO-220F)

Test Circuit

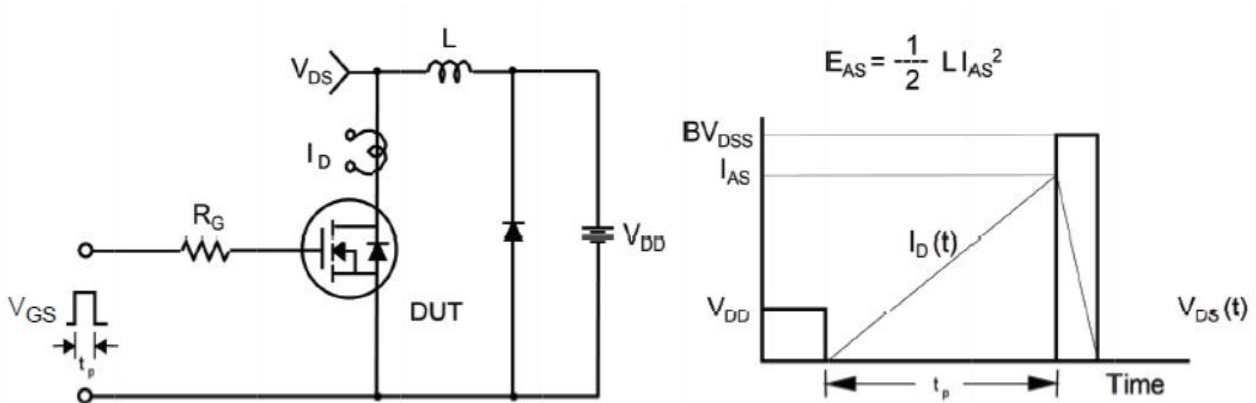
Gate Charge Test Circuit & Waveform



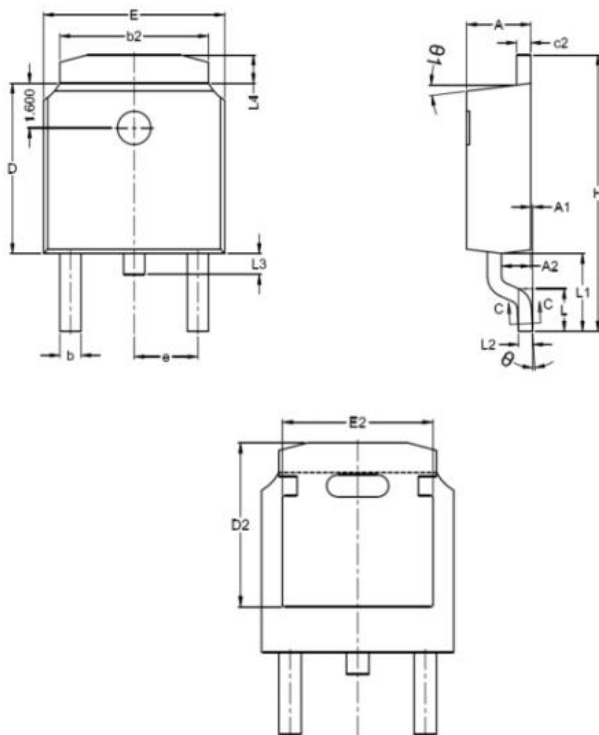
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



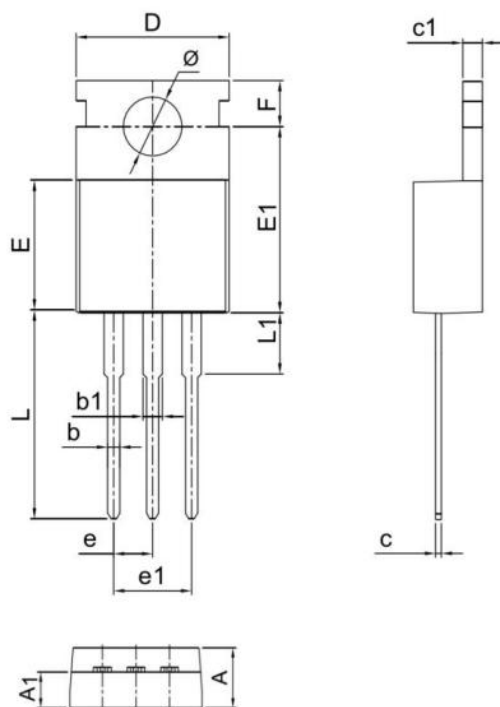
Mechanical Dimensions for TO-252



COMMON DIMENSIONS

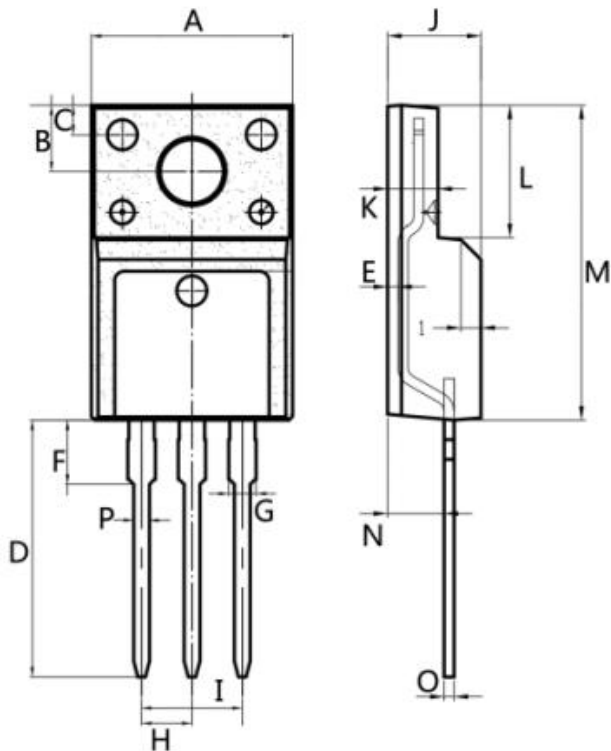
SYMBOL	MM	
	MIN	MAX
A	2.10	2.50
A1	0	0.15
b	0.7	0.9
b2	5.13	5.54
c	0.44	0.65
c2	0.45	0.65
D	6.00	6.20
D2	5.37	5.78
E	6.30	6.90
E2	4.90	5.30
e	2.23	2.33
H	9.7	10.5
L	1.38	1.73
L1	2.58	3.00
L2	0.50	0.52
L3	0.60	1.00
L4	0.81	1.42

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
ϕ	3.74	3.95



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

Ordering Information

Part	Package	Marking	Packing method	Minimum packing number
DTU5N65	TO-252	DTU5N65	Tape and reel	2.5K / Reel
DTP5N65	TO-220	DTP5N65	Tube	50 / Tube
DTP5N65F	TO-220F	DTP5N65F	Tube	50 / Tube

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