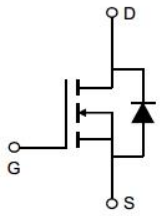
100V N-Channel Power MOSFET

Description

The IRF540N uses advanced trench technology toprovide excellent RDS(ON), low gate charge. It can be used in a wide variety of applications.



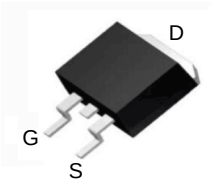
Schematic diagram

Key Characteristics

•VDS = 100V,ID =30A

RDS(ON) < 30mΩ @ VGS=10V

- High density cell design for lower Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high EAS
- Excellent package for good heat dissipation



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Application

- Power switching application
- Hard switched and High frequency circuits
- Uninterruptible power supply

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	30	A
Drain Current-Pulsed (Note 1)	I_{DM}	100	A
Maximum Power Dissipation(Tc=25	P_D	70	W
Single pulse avalanche energy(Note 2)	E_{AS}	96	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	3.5	℃/W

Electrical Characteristics (TA=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	2	3	4	V
Drain-Source On-State Resistance(Note 3)	$R_{DS(ON)}$	V_{GS}=10V, I_D=12A	-	25	30	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=15A	-	11	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	2550	-	pF
Output Capacitance	C_{oss}		-	225	-	pF
Reverse Transfer Capacitance	C_{rss}		-	205	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V, I_D=20A, V_{GS}=10V, R_{GEN}=10Ω	-	29	-	nS
Turn-on Rise Time	t_r		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	58.2	-	nS
Turn-Off Fall Time	t_f			13.4	-	nS
Total Gate Charge	Q_g	V_{DS}=80V,I_D=20A V_{GS}=10V	-	55	-	nC
Gate-Source Charge	Q_{gs}		-	15	-	nC
Gate-Drain Charge	Q_{gd}		-	20	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=20A	-	-	1.2	V
Reverse Recovery Time	T_{rr}	T_j=25℃， I_F=10A， di/dt=100A/uS note3?	-	58	-	nS
Reverse Recovery Charge	Q_{rr}		-	110	-	nC

Notes:
1.Repetitive Rating: Pulse width limited by maximum junction temperature.
2.EAS condition :Tj=25℃,VDD=50V,VGS=10V,L=0.5mH,Rg=25Ω
3.Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4.Guaranteed by design, not subject to production.

CharacteristicsCurves

Figure 1 Output Characteristics

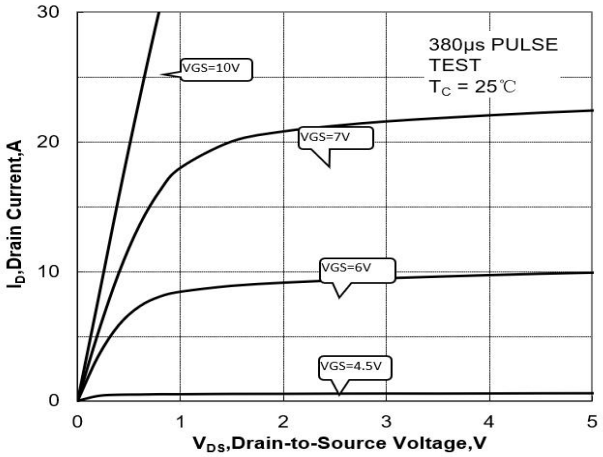


Figure 2 Transfer Characteristics

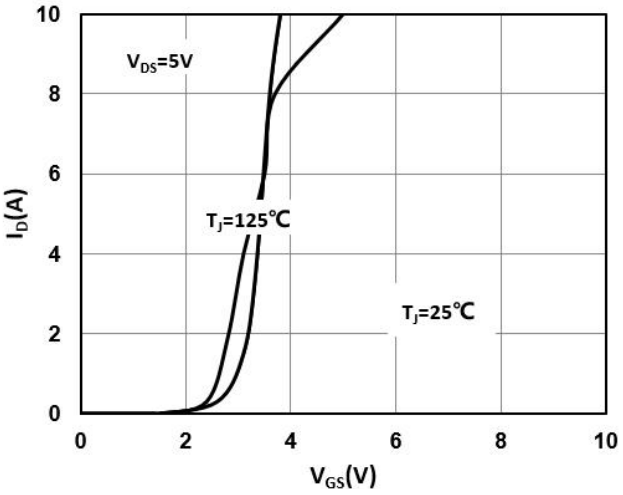


Figure 3 On-Resistance vs. ID and V_{GS}

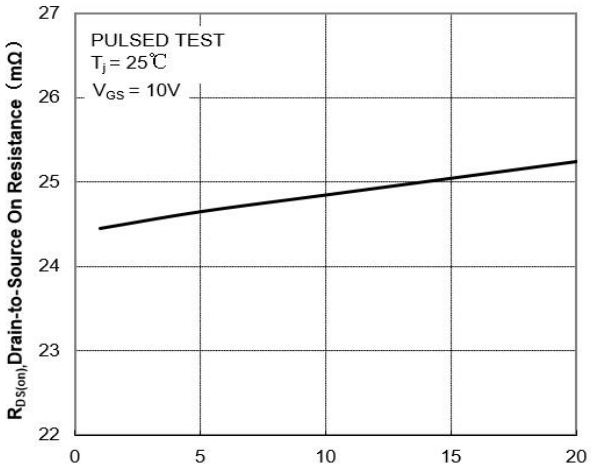


Figure 4 On-Resistance vs. Junction Temperature

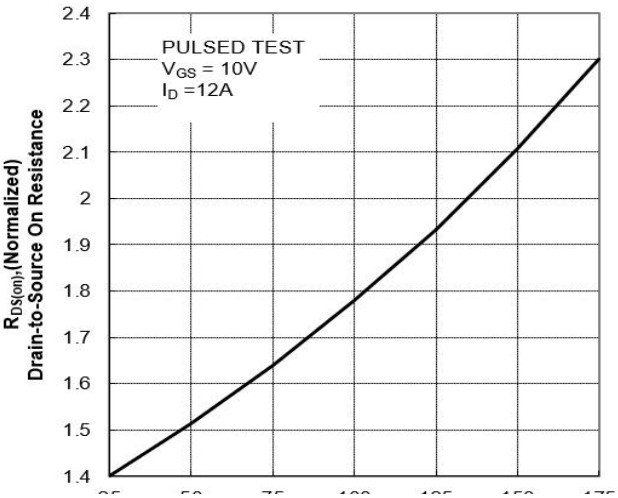


Figure 5 On-Resistance vs. V_{GS}

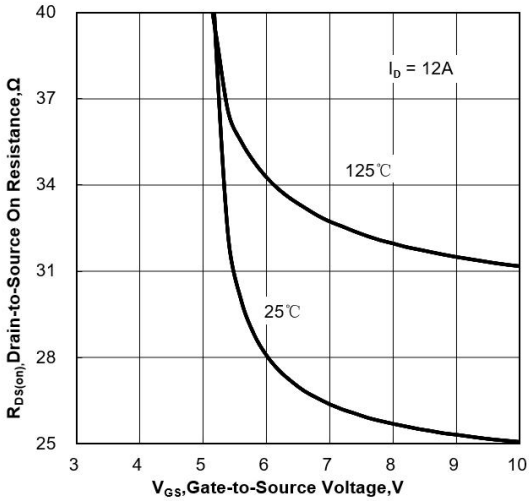


Figure 6 Body Diode Forward Voltage

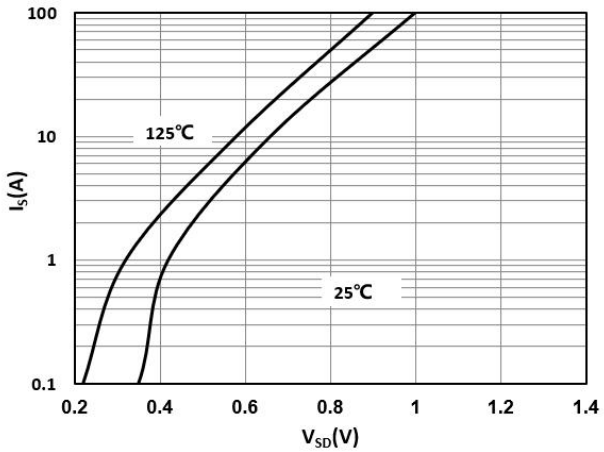


Figure 7 Gate-Charge Characteristics

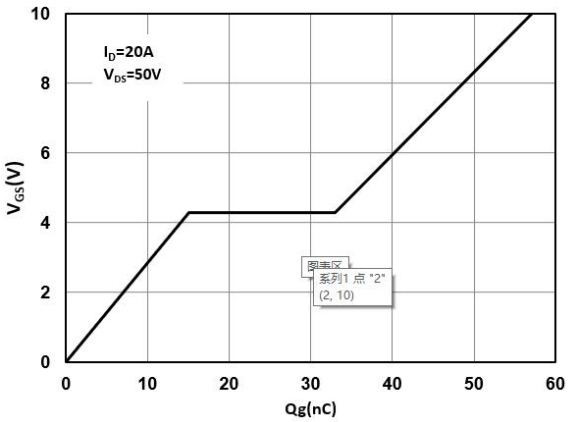


Figure 8 Capacitance Characteristics

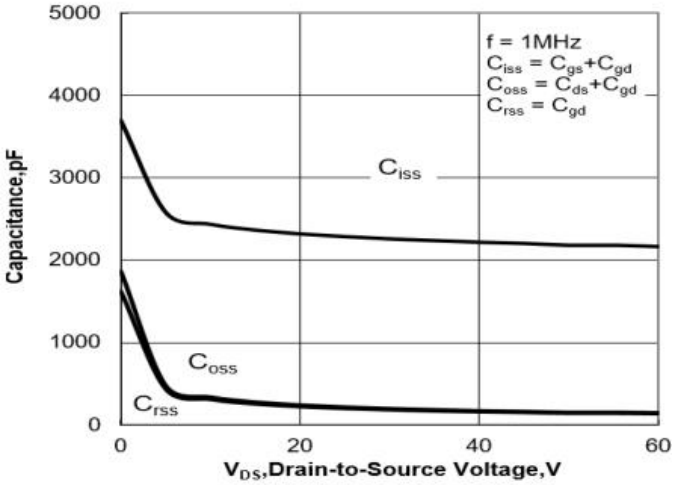


Figure 9 Maximum Forward Biased Safe Operation Area

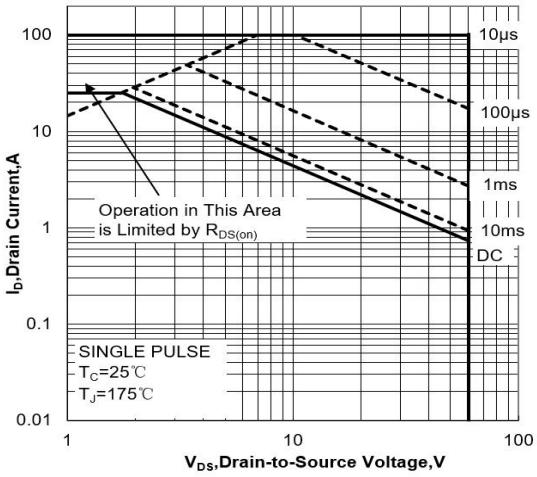


Figure 10 Single Pulse Power Rating Junction-to-Ambient

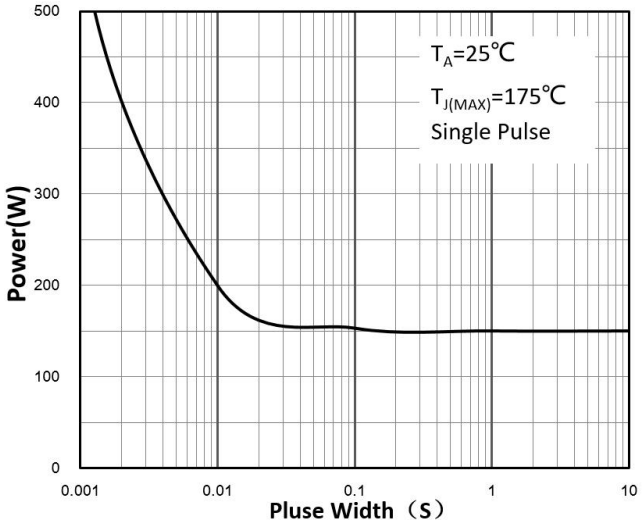
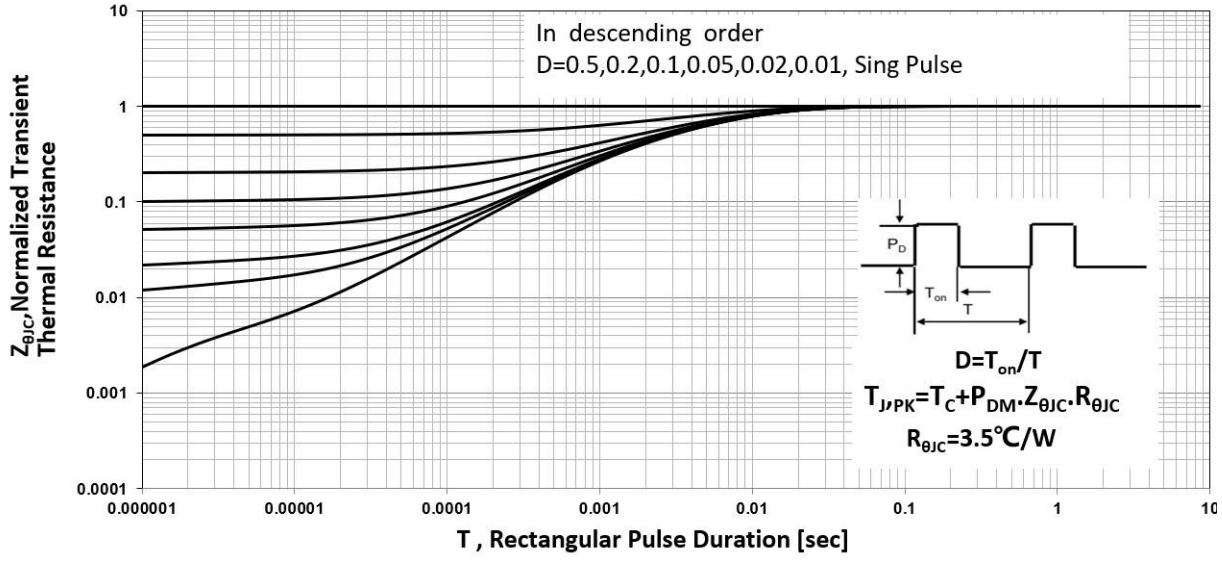
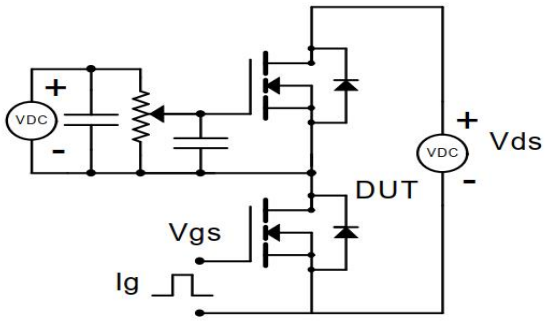


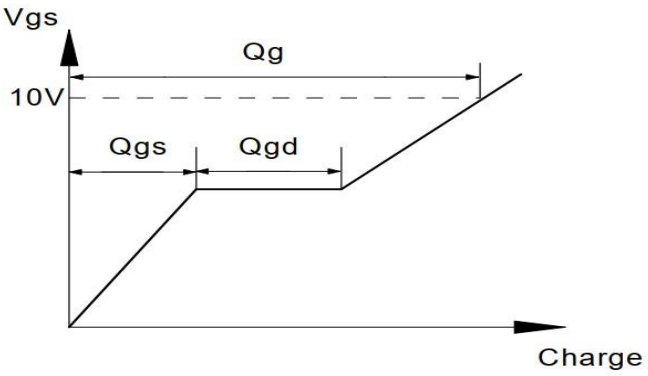
Figure 11 Normalized Maximum Transient Thermal Impedance



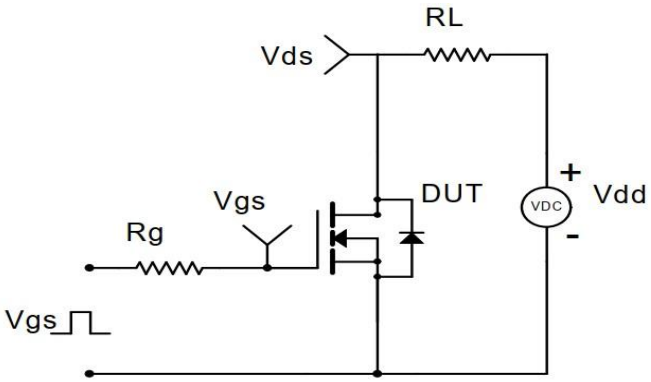
Gate Charge Test Circuit



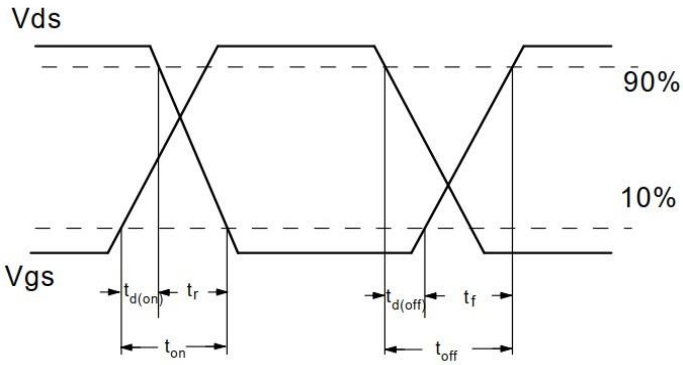
Gate Charge Test Waveform



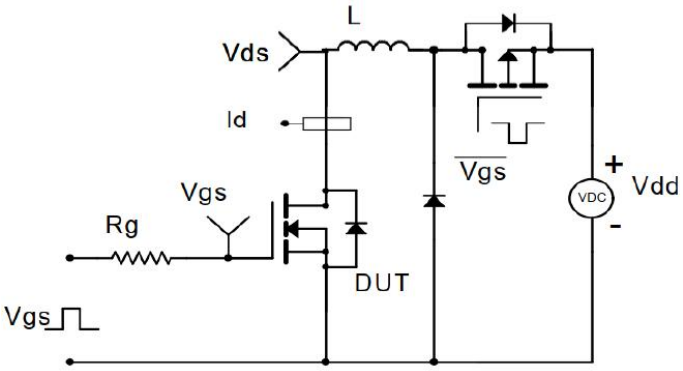
Resistive Switching Test Circuit



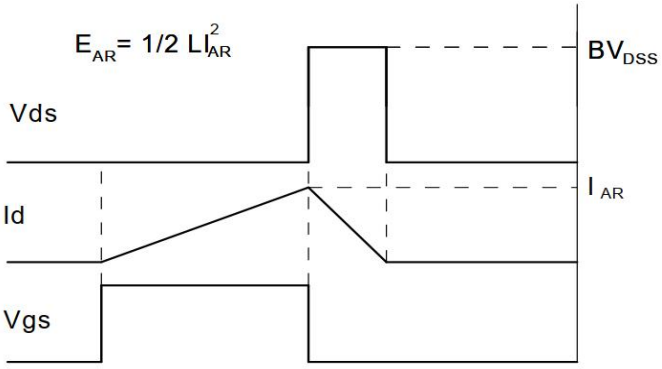
Resistive Switching Test Waveforms



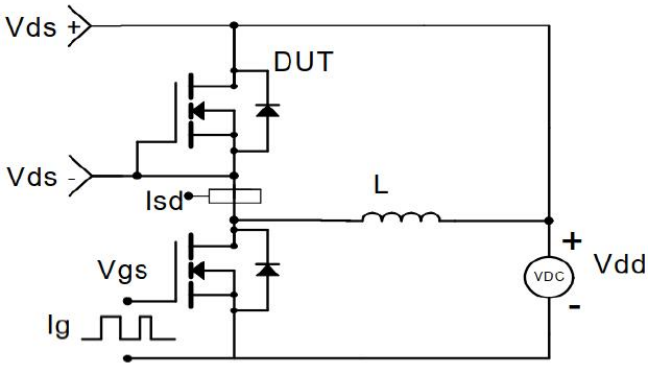
Unclamped Inductive Switching (UIS) Test Circuit



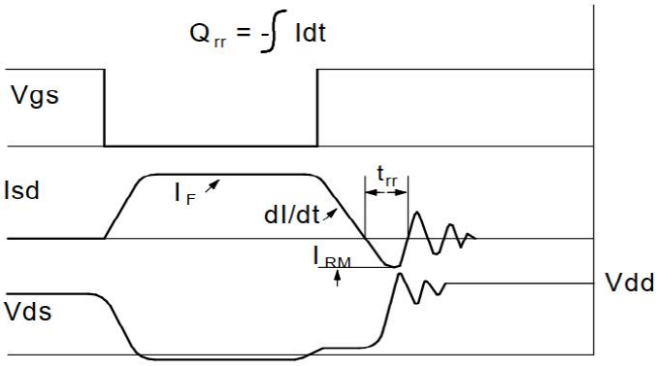
Unclamped Inductive Switching (UIS) Test Waveforms



Diode Recovery Test Circuit



Diode Recovery Test Waveforms



Package Demensions

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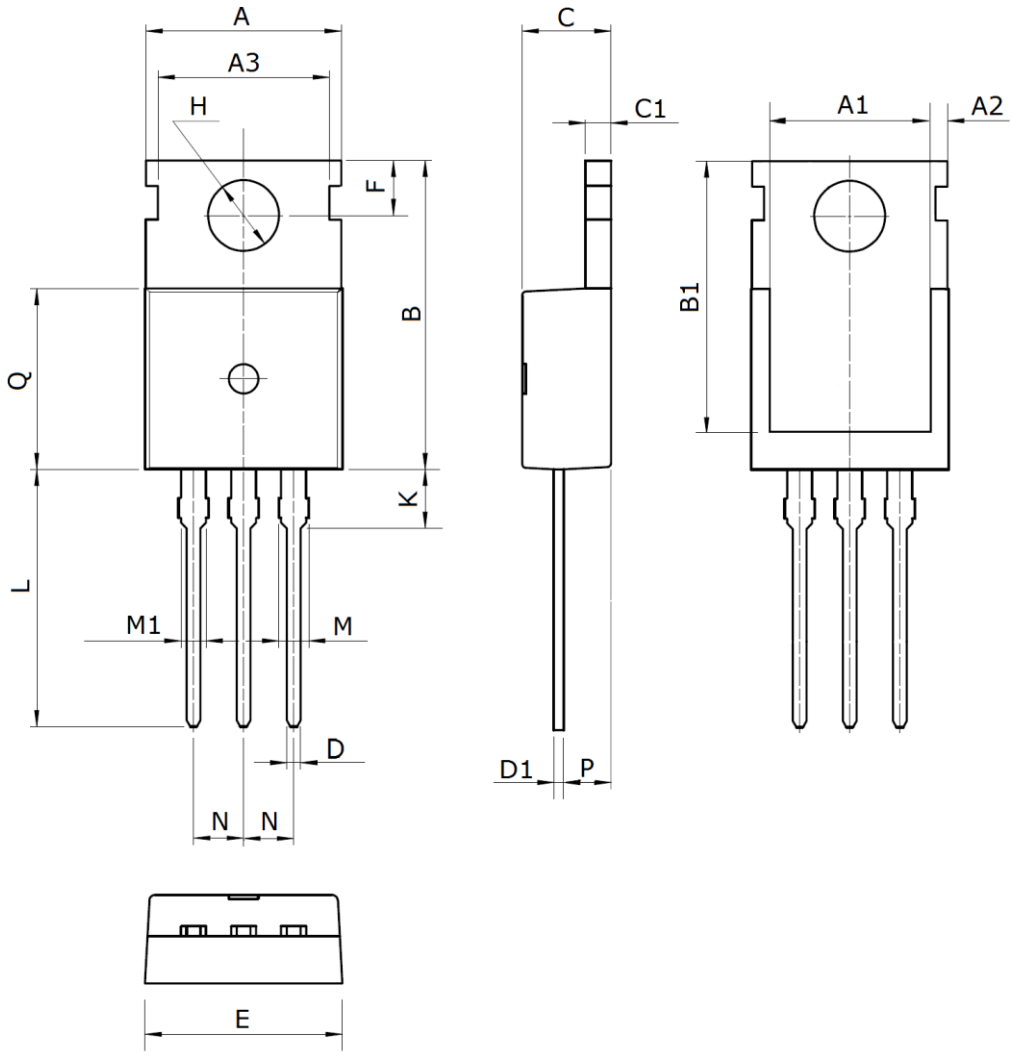

Symbol	Dimensions （mm）	Symbol	Dimensions (mm)	Symbol	Dimensions (mm)
A	10.0±0.3	C1	1.3±0.2	L	13.2±0.4
A1	8.0±0.2	D	0.8±0.2	M	1.38±0.1
A2	0.94±0.1	D1	0.5±0.1	M1	1.28±0.1
A3	8.7±0.1	E	10.0±0.3	N	2.54(typ)
B	15.6±0.4	F	**2.8±0.1**	P	2.4±0.3
B1	**13.2±0.2**	H	3.6±0.1	Q	**9.15±0.25**
C	**4.5±0.2**	K	3.1±0.2		

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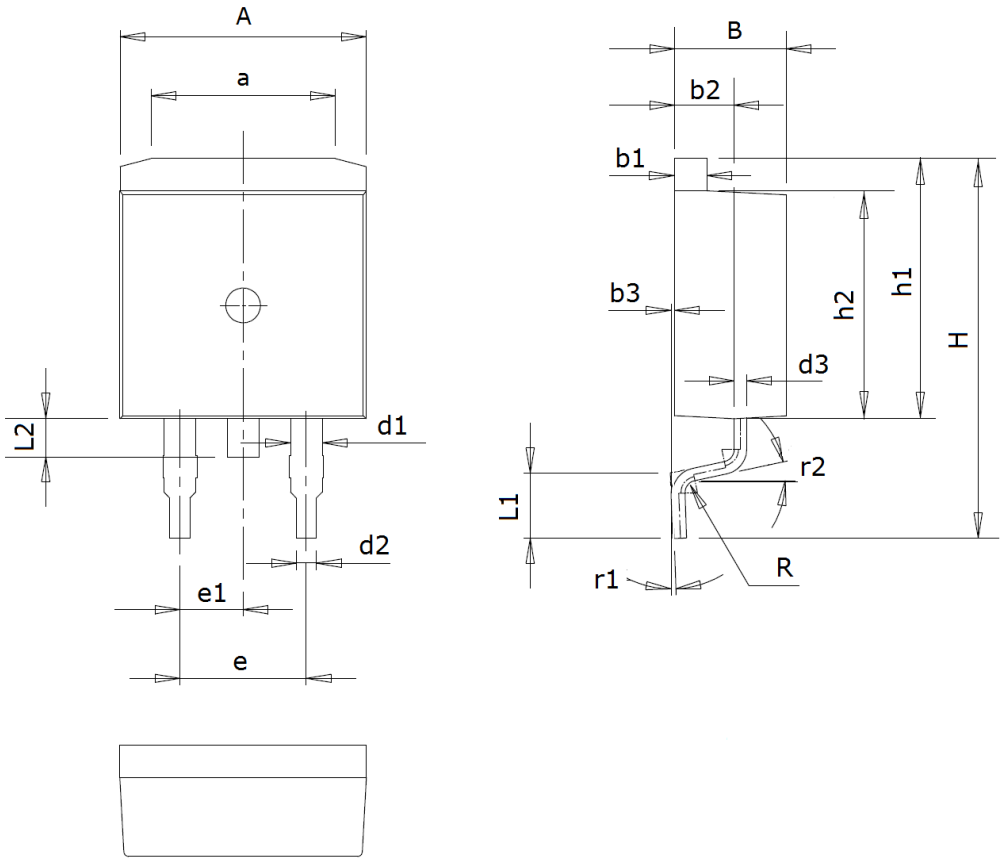

Symbol	Dimensions （mm）	Symbol	Dimensions (mm)	Symbol	Dimensions (mm)
A	9.7～10.3	d2	0.7～0.9	L1	2.4~2.9
a	7.0～7.8	d3	0.4～0.6	L2	1.3~1.8
B	4.3～4.7	e	5.08（typ）	R	0.5(typ)
b1	1.25～1.35	e1	2.54（typ）	r1	0~8°
b2	2.2～2.6	H	14.8~15.6	r2	12°（typ）
b3	0～0.2	h1	10.2~10.7		
d1	1.2～1.4	h2	8.9~9.4		

Ordering information

Order code	Package	Baseqty	Deliverymode	Marking
UMW IRF540N	TO-220	1000	Tape and reel	IRF540
UMW IRF540NSTRL	TO-263	800	Tape and box	F540NS