WCR380N65T/WCR380N65TF/ WCR380N65TH
650V N-Channel Super Junction MOSFET

Description

The WCR380N65T series is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance. This advanced technology has been tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher avalanche energy. This device is suitable for various AC/DC power conversion in switching mode operation for higher efficiency.

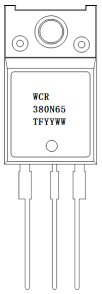
Features

- 700V@T_J=150°C
- Typ.$R_{DS(on)}$=0.33Ω
- Low gate charge(typ. Qg= 32nC)
- 100% avalanche tested
- 100% R_g tested

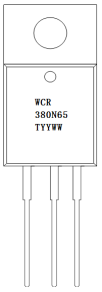
Order Information

Device	Package	Marking	Units/Tube	Units/Real
WCR380N65T-3/T	TO-220	WCR380N65TYYWW	50	
WCR380N65TF-3/T	TO-220F	WCR380N65TFYYWW	50	
WCR380N65TH-3/TR	TO-263E-2	WCR380N65THYW		800

Note 1: WCR380N65T=Device code ; YY=Year ;WW=Week (A~z);
Note 2: WCR380N65TF=Device code ; YY=Year ;WW=Week (A~z);
Note 3: WCR380N65TH=Device code ; Y=Year ;W=Week (A~z);



TO-220



TO-220F

TO-263E-2

Absolution Maximum Ratings T_A=25°C unless otherwise noted					
Parameter		**Symbol**	**WCR380N65T WCR380N65TH**	**WCR380N65TF**	**Unit**
Drain-Source Voltage		V_{DS}	650		V
Gate-Source Voltage		V_{GS}	±30		
Continuous Drain Current [A]	T_C=25°C	I_D	10.6		A
	T_C=100°C		6.7		
Pulsed Drain Current [B]		I_{DM}	30		A
Single Pulsed Avalanche Energy [C]		E_{AS}	215		mJ
Avalanche Current [B]		I_{AR}	2.7		A
Repetitive Avalanche Energy [B]		E_{AR}	0.30		mJ
Power Dissipation	T_C=25°C	P_D	83	31.2	W
	Derate above 25°C		0.66	0.25	W/°C
Operating and Storage Temperature Range		T_J,T_{STG}	-55~150		°C
Lead Temperature		T_L	260		°C
Thermal Resistance Ratings					
Maximum Junction-to-Ambient		$R_{\theta JA}$	60	80	°C/W
Maximum Junction-to-Case		$R_{\theta JC}$	1.5	4	

Electronics Characteristics (T_A=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250uA,T_J=25°C	650			V
		V_{GS} = 0 V, I_D = 250uA,T_J=150°C		700		V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 600V, V_{GS} = 0V,T_J=25°C			1	uA
Gate-to-source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} =±30 V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250uA	2.5		4.5	V
Drain-to-source On-resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 5A (NOTE D)		0.33	0.38	Ω
Forward Transconductance	Gfs	V_{DS}= 40V, I_D= 5A			20	s
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 400 V		1140		pF
Output Capacitance	C_{OSS}			30		
Reverse Transfer Capacitance	C_{RSS}			4		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V,V_{DS} = 480 V, I_D = 10A		32		nC
Gate-to-Source Charge	Q_{GS}			7.3		
Gate-to-Drain Charge	Q_{GD}			14.7		
Gate resistance	R_g	V_{GS}=0V,V_{DS}=0V,F=1MHZ		7.4		Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 400 V, I_D = 11A, R_G=20 Ω		21		ns
Rise Time	t_r			38		
Turn-Off Delay Time	$t_{d(off)}$			84		
Fall Time	t_f			27		
Drain to Source Diode Characteristics and Maximum Ratings						
Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 9.5A			1.5	V
Body-Diode Continuous Current	I_S				10	A
Body-Diode Pulsed Current	I_{SM}				30	A
Body Diode Reverse Recovery Time	T_{rr}	I_F=9.5A,dI/dt=100A/us, V_{DS}=100V		347		nS
Body Diode Reverse Recovery Charge	Q_{rr}			4		uC
Peak reverse recovery Current	I_{rrm}			23		A

NOTES:

A. Drain current limited by maximum junction temperature. Maximum duty cycle D=0.75

B. Pulse width limited by maximum junction temperature

C. L=60mH, I_{AS}=2.7A, V_{DD}=50V, Starting T_J=25℃

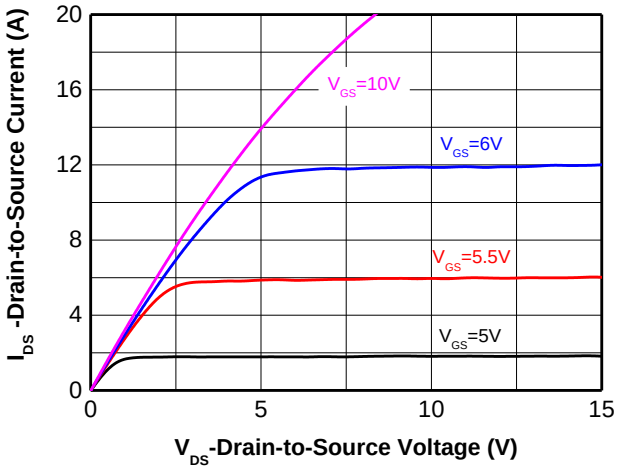
D. Pulse Test: Pulse width≤300us, Duty Cycle ≤2%

E. Essentially Independent of Operating Temperature Typical Characteristics

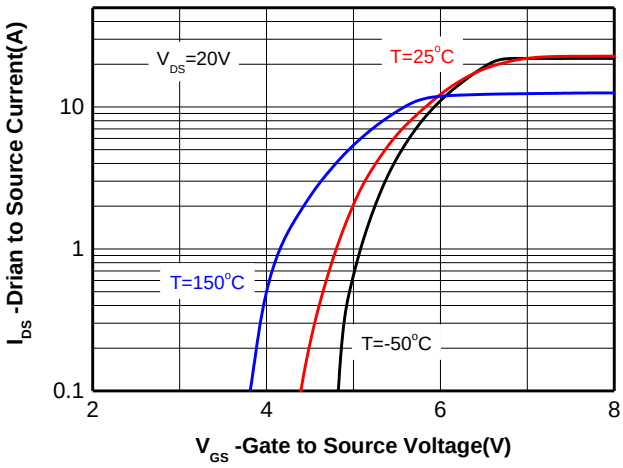
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heat sink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.

G. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.

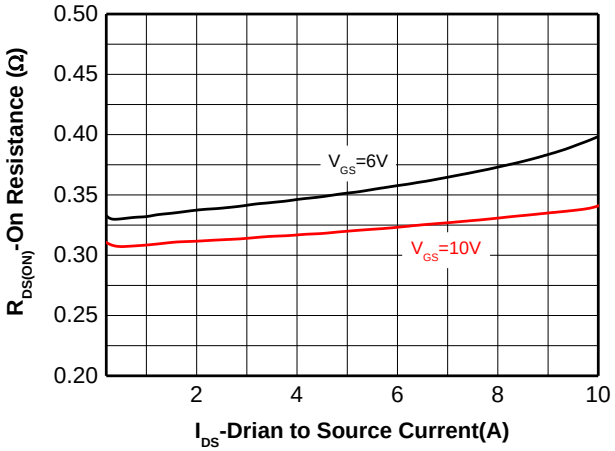
Typical Characteristics (T_A=25°C, unless otherwise noted)



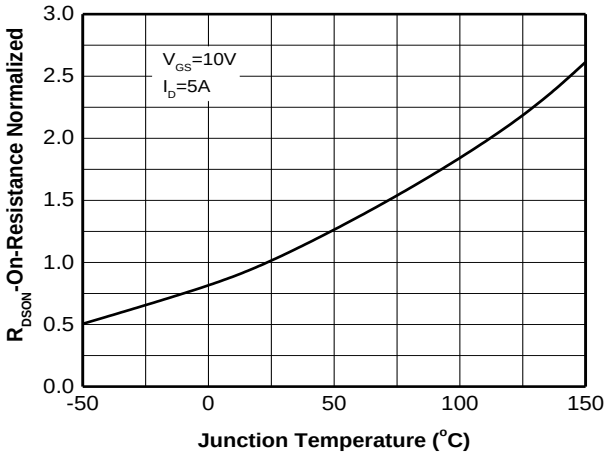
Output characteristics



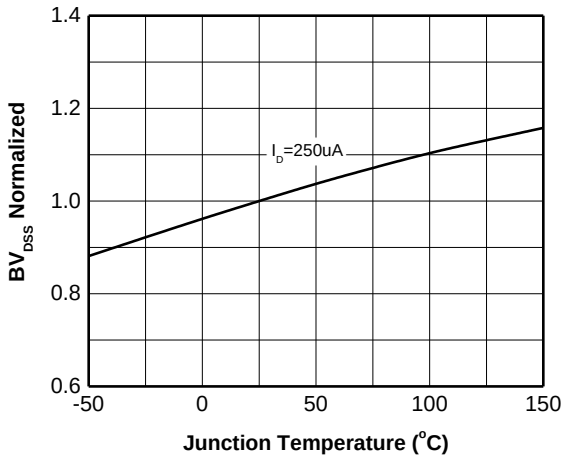
Transfer characteristics



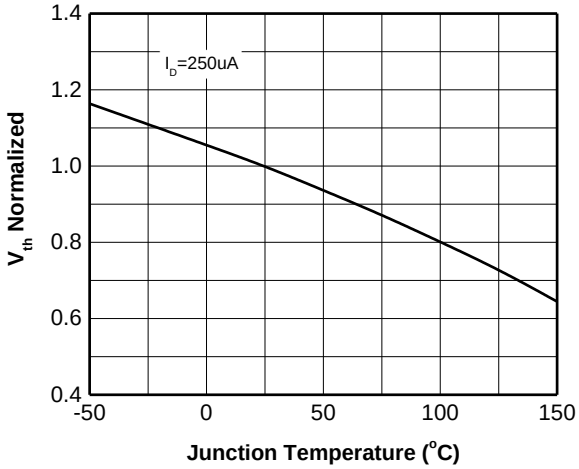
On-Resistance vs. Drain current



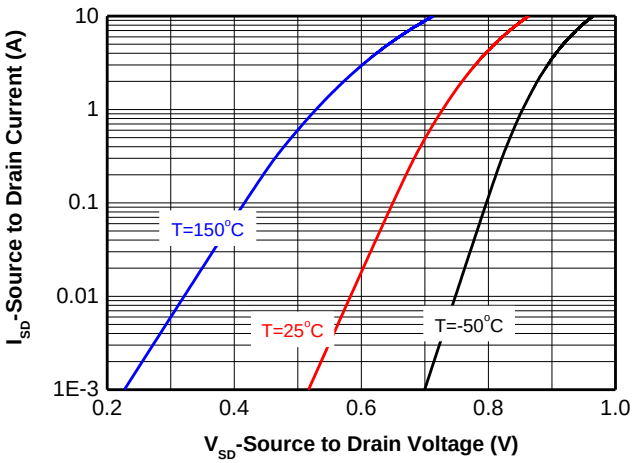
On-Resistance vs. Junction temperature



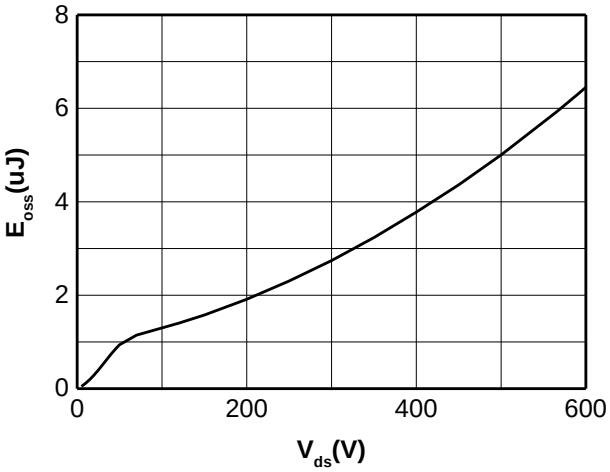
Breakdown Voltage vs. Junction temperature



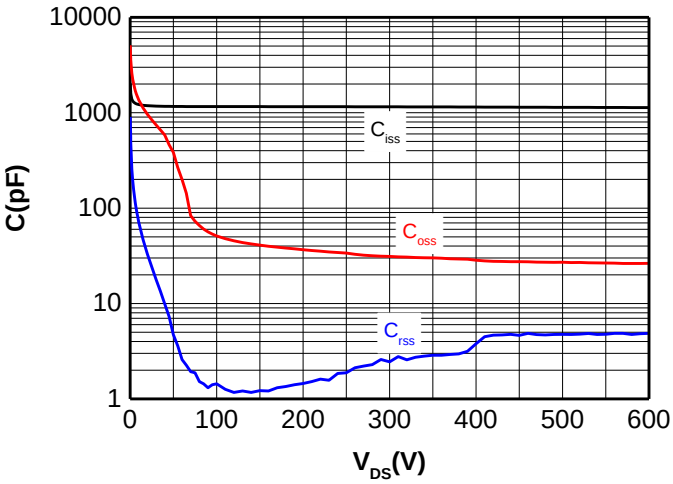
Threshold voltage vs. Junction temperature



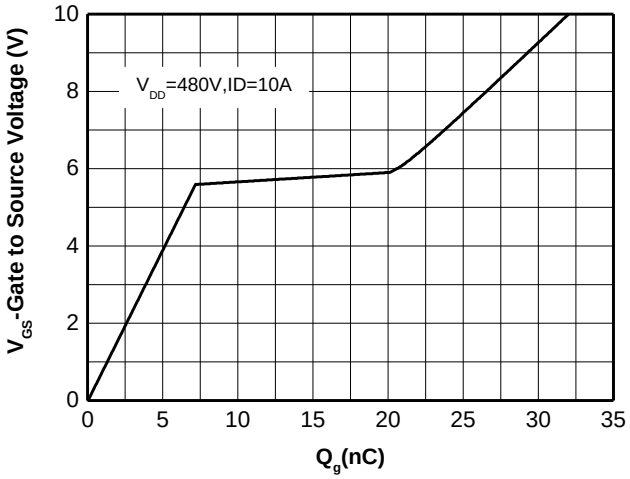
Body diode forward voltage



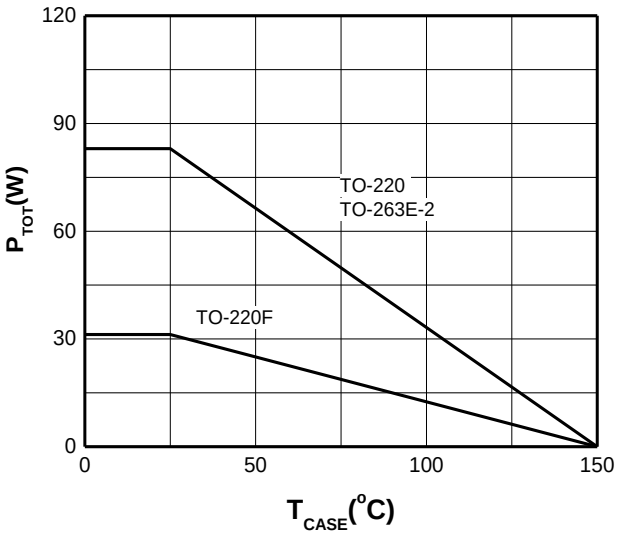
Coss stored Energy



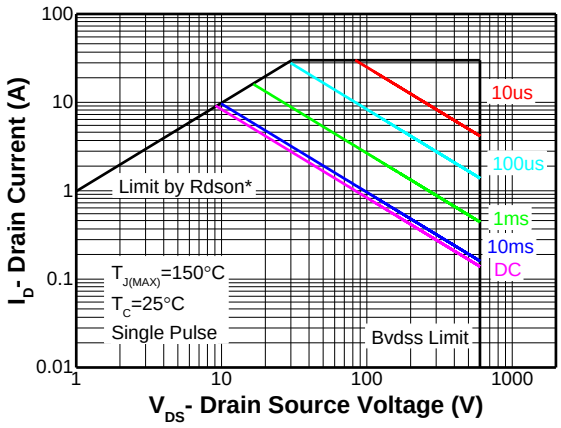
Capacitance



Gate charge Characteristics



Power dissipation



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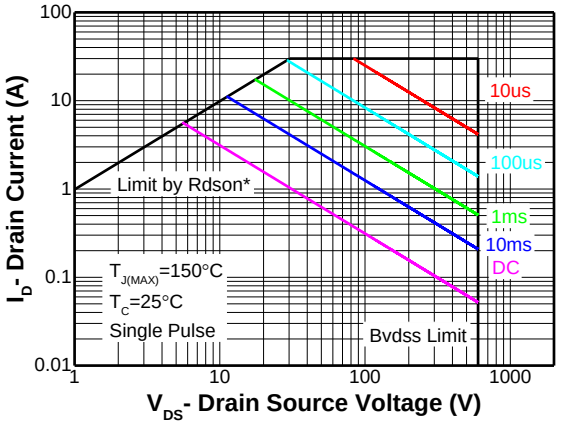
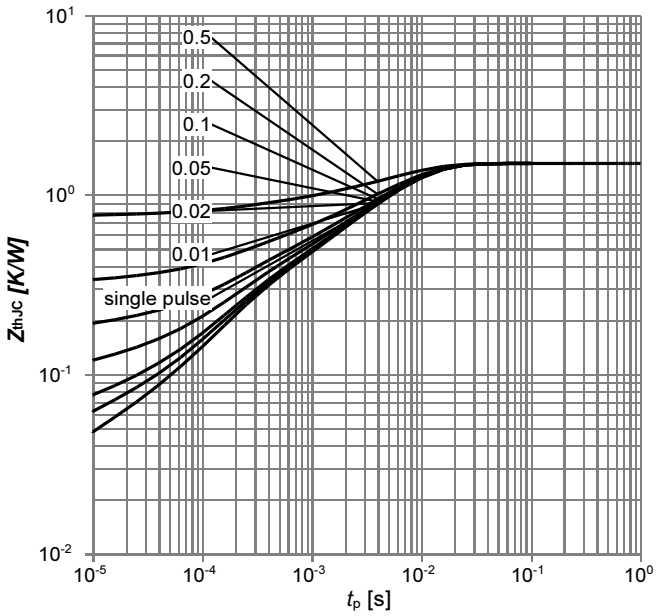
Safe operating area(Note F)



TO-220F

Safe operating area(Note F)



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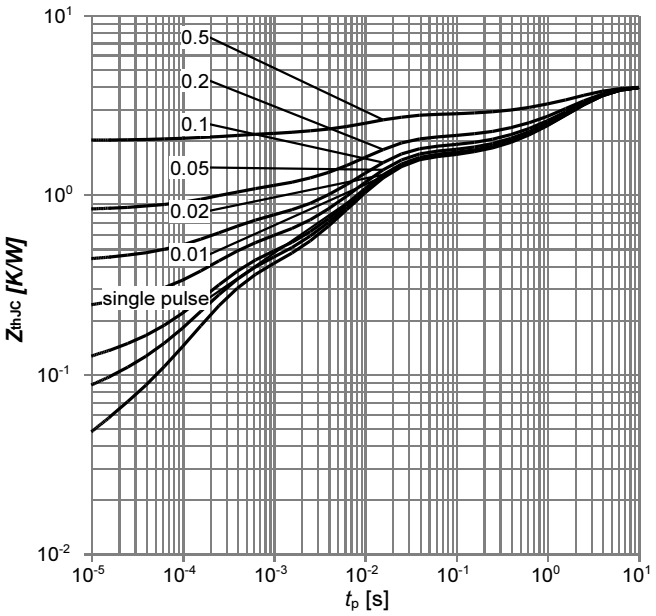

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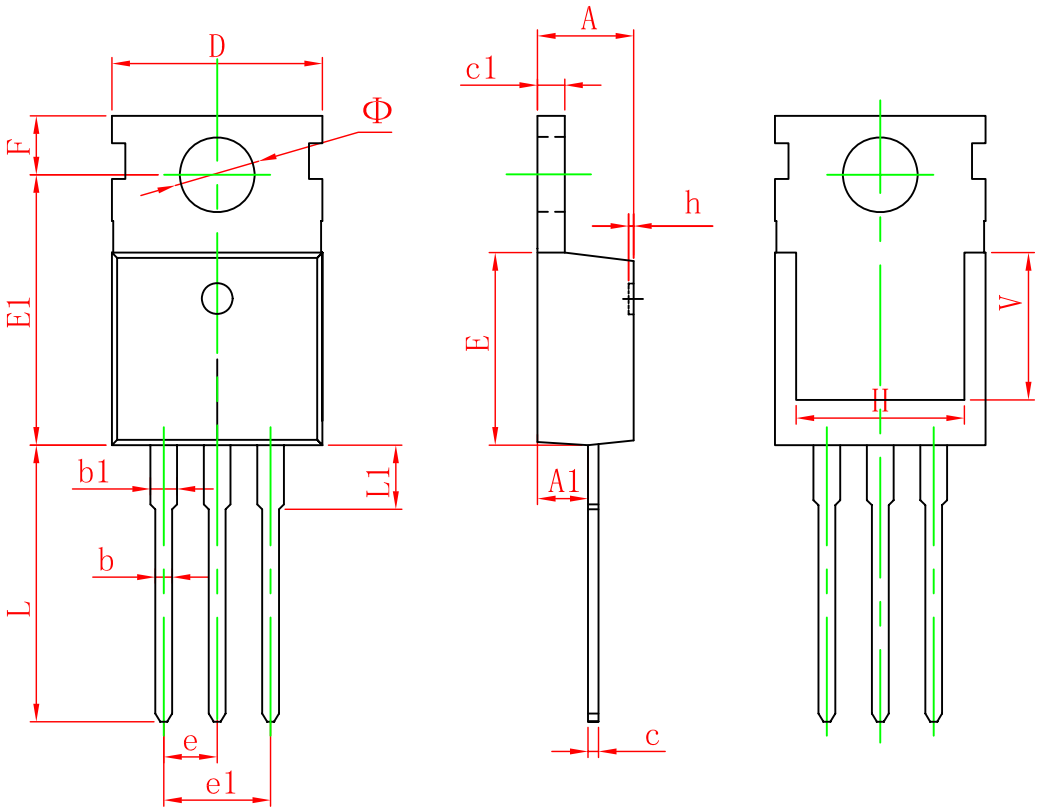
Transient thermal response (Junction-to-Case)(Note F)

Package outline dimensions

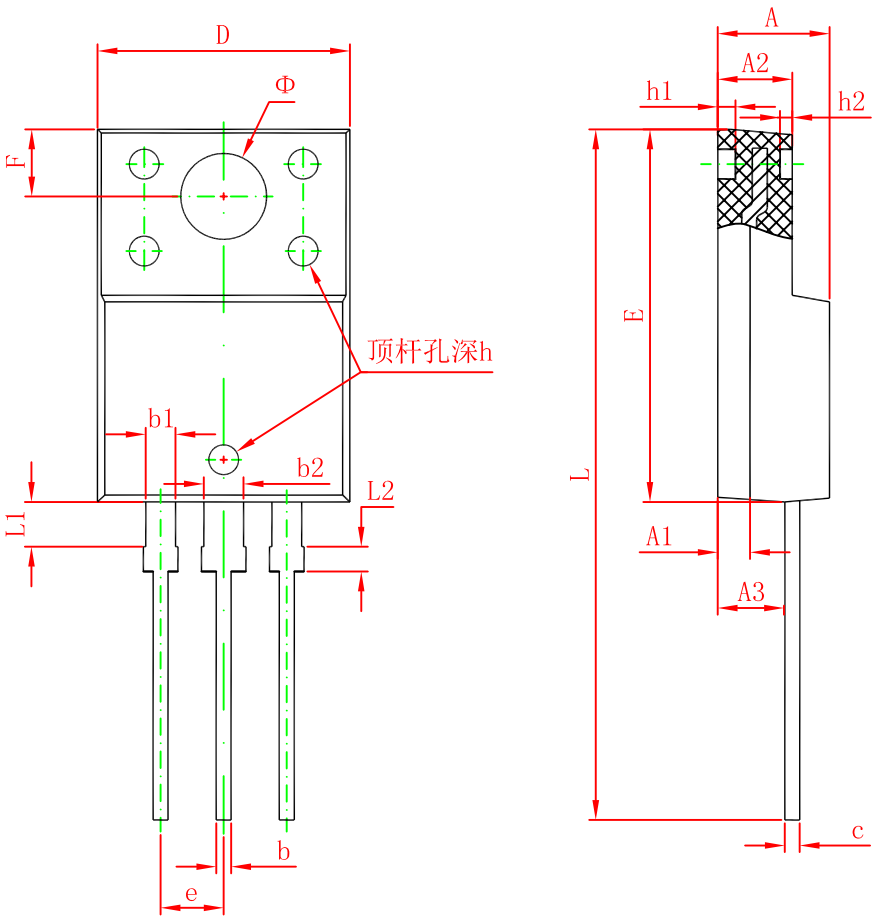
TO-220-3L



Symbol	Dimensions in Millimeters	
	Min.	Max.
A	4.40	4.60
A1	2.25	2.55
b	0.71	0.91
b1	1.17	1.37
c	0.33	0.65
c1	1.20	1.40
D	9.91	10.25
E	8.95	9.75
E1	12.65	12.95
e	2.54 Typ.	
e1	4.98	5.18
F	2.65	2.95
H	7.90	8.10
h	0.00	0.30
L	12.90	13.40
L1	2.85	3.25
V	6.90 Ref.	
Φ	3.40	3.80

Package outline dimensions

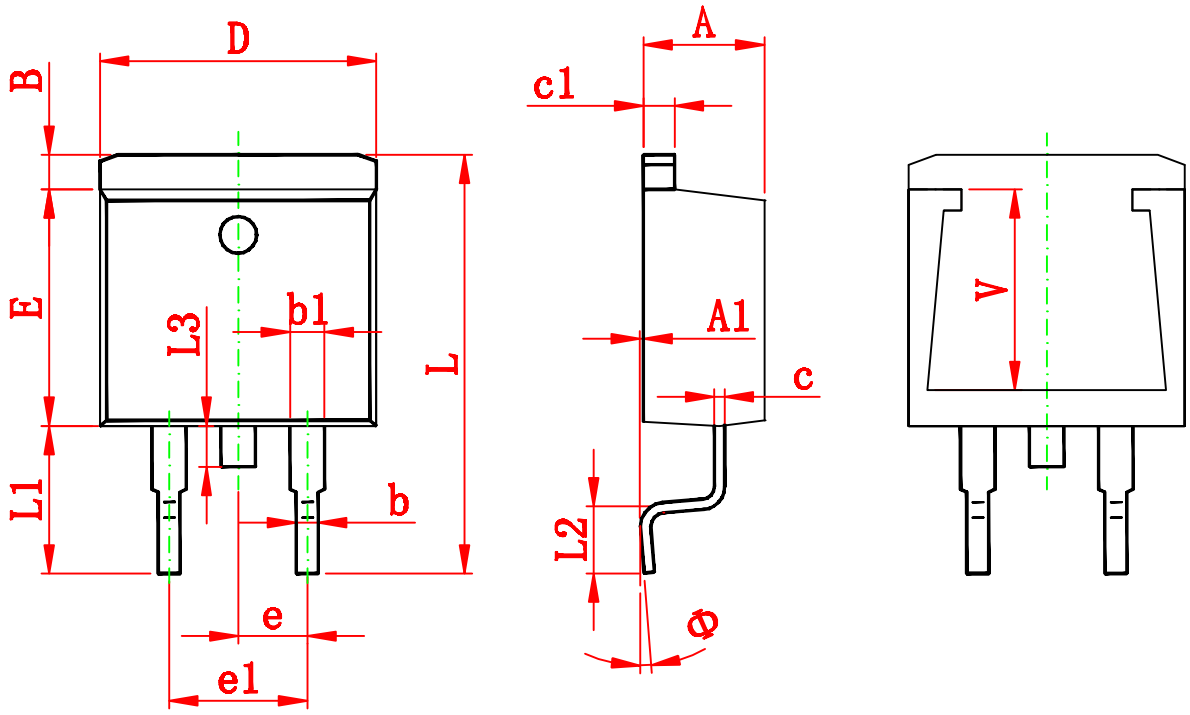
TO-220F-3L



Symbol	Dimensions in Millimeters	
	Min.	Max.
A	4.30	4.70
A1	1.30 Ref.	
A2	2.80	3.20
A3	2.50	2.90
b	0.50	0.75
b1	1.10	1.35
b2	1.50	1.75
c	0.50	0.75
D	9.96	10.36
E	14.80	15.20
e	2.54 Typ.	
F	2.70 Ref.	
Φ	3.50 Ref.	
h	0.00	0.30
h1	0.80 Ref.	
h2	0.50 Ref.	
L	28.00	28.40
L1	1.70	1.90
L2	0.90	1.10

Package outline dimensions

TO-263E-2L

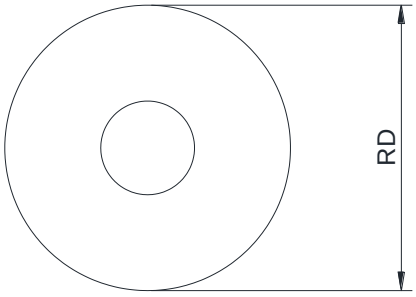


Symbol	Dimensions in Millimeters	
	Min.	Max.
A	4.47	4.67
A1	0.00	0.15
B	1.12	1.42
b	0.71	0.91
b1	1.17	1.37
c	0.31	0.53
c1	1.17	1.37
D	10.01	10.31
E	8.50	8.90
e	2.54 Typ.	
e1	4.98	5.18
L	14.94	15.50
L1	4.95	5.45
L2	2.34	2.74
L3	1.30	1.70
Φ	0 °	8 °
V	6.60 Ref.	

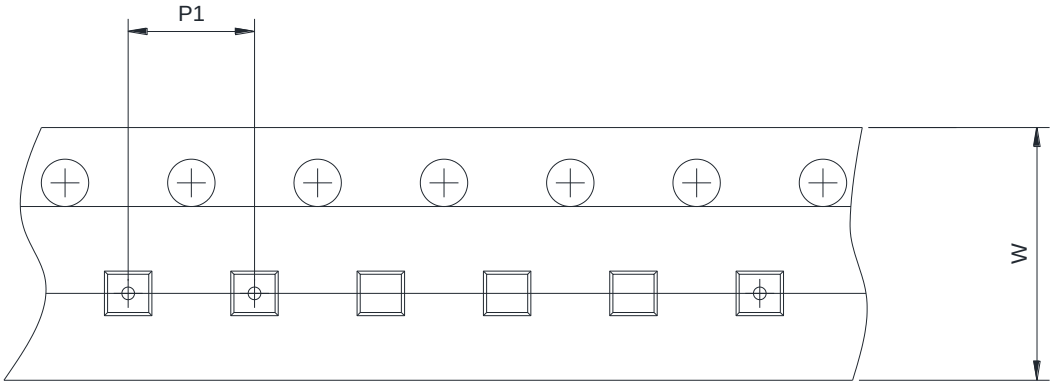
TAPE AND REEL INFORMATION

TO-263E-2L

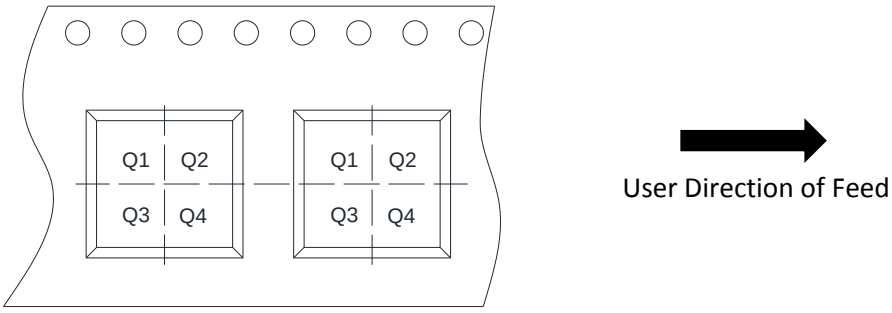
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimension	☐ 7 inch ■ 13 inch
P1	Pitch between successive cavity centers	☐ 4 mm ☐ 8 mm ■ 16 mm
W	Overall width of the carrier tape	☐ 8 mm ☐ 12 mm ■ 24 mm
Pin1	Pin1 Quadrant	☐ Q1 ☐ Q2 ☐ Q3 ☐ Q4