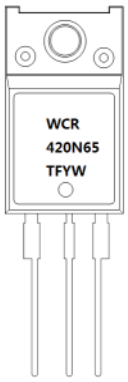
WCR420N65TF/TG
650V N-Channel Super Junction MOSFET

Description

The WCR420N65 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.

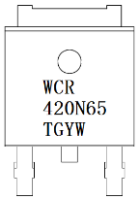
Features

- 700V@TJ=150° C
- Typ.RDS(on)=0.37Ω
- Low gate charge
- 100% avalanche tested
- 100% Rg tested



G D S

TO-220F



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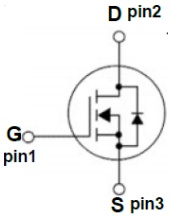
TO-252



Order Information

Device	Package	Marking	Units/Tube	Units/Real
WCR420N65TF-3/T	TO-220F	WCR420N65TFYW(1)	50	
WCR420N65TG-3/TR	TO-252E-2L	WCR420N65TGYW(2)		2500

Note 1: WCR420N65TF=Device code ;Y=Year ;W=Week (A~z);
Note 2: WCR420N65TG=Device code ;Y=Year ;W=Week (A~z);

Absolution Maximum Ratings T_A=25°C unless otherwise noted					
Parameter		**Symbol**	**WCR420N65TG**	**WCR420N65TF**	**Unit**
Drain-Source Voltage		V_{DS}	650		V
Gate-Source Voltage		V_{GS}	±30		
Continuous Drain Current[A]	T_C=25°C	I_D	10.2	5.8	A
	T_C=100°C		6.4	3.7	
Pulsed Drain Current		I_{DM}	41		A
Single Pulsed Avalanche Energy[B]		E_{AS}	145		mJ
Power Dissipation	T_C=25°C	P_D	96	31.2	W
	Derateabove 25°C		0.76	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		$R_{th(ch-A)}$	62[D]	80	°C/W
Maximum Junction-to-Case		$R_{th(ch-c)}$	1.3	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
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =650V, V_{GS} = 0V,T_J=25°C			1	uA
Gate-to-source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} =±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250uA	2	3	4	V
Drain-to-source On-resistance	$R_{DS(on)}$[C]	V_{GS} = 10V, I_D = 5A		0.37	0.42	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz,V_{DS} = 400 V		705		pF
Output Capacitance	C_{OSS}			18		
Reverse Transfer Capacitance	C_{RSS}			1		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V,V_{DS} = 400 V, I_D = 10A		19.5		nC
Gate-to-Source Charge	Q_{GS}			4.5		
Gate-to-Drain Charge	Q_{GD}			8.5		
Gate resistance	R_g	V_{GS}=0V ,F=1MHZ,drain open		8.2		Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V, V_{DS} = 400 V, I_D = 5A,R_G=10 Ω		12.2		ns
Rise Time	t_r			22.5		
Turn-Off Delay Time	$t_{d(off)}$			40		
Fall Time	t_f			19.5		
Drain to Source Diode Characteristics and Maximum Ratings						
Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 5A			1.5	V
Body-Diode Continuous Current	I_S			10.2		A
Body-Diode Pulsed Current	I_{SM}			41		A
Body Diode Reverse Recovery Time	T_{rr}	I_F=5A,dI/dt=100A/us,V_{DS}=400V		240		nS
Body Diode Reverse Recovery Charge	Q_{rr}			1.74		uC
Peak reverse recovery Current	I_{rrm}			14.5		A

NOTES:

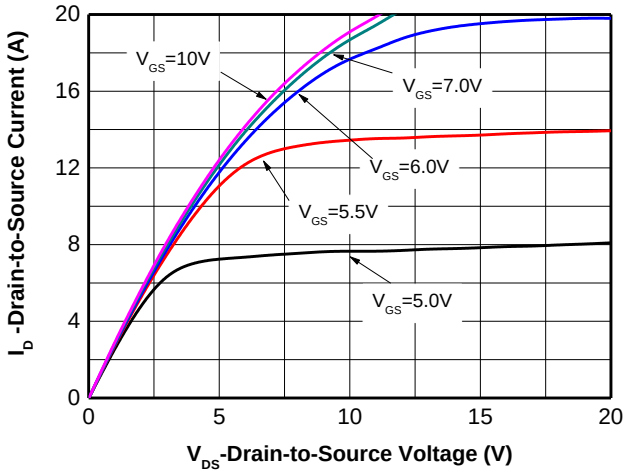
A. Drain current limited by maximum junction temperature. Maximum duty cycle D=0.75

B. L=100mH, I_{AS}=1.7A, V_{DD}=50V, Starting T_J=25℃

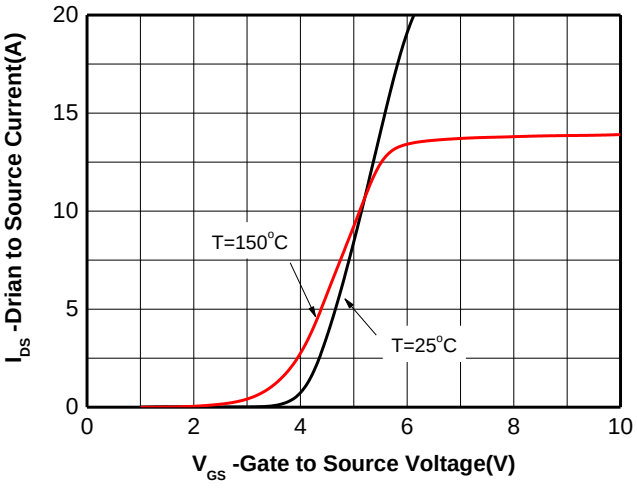
C. Pulse Test: Pulse width≤300us, Duty Cycle ≤2% sensitively Independent of Operating Temperature Typical Characteristics

D. 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.

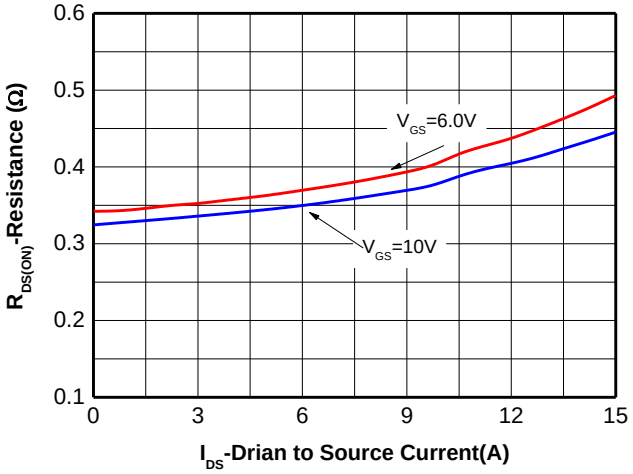
Typical Characteristics (T_A=25°C, unless otherwise noted)



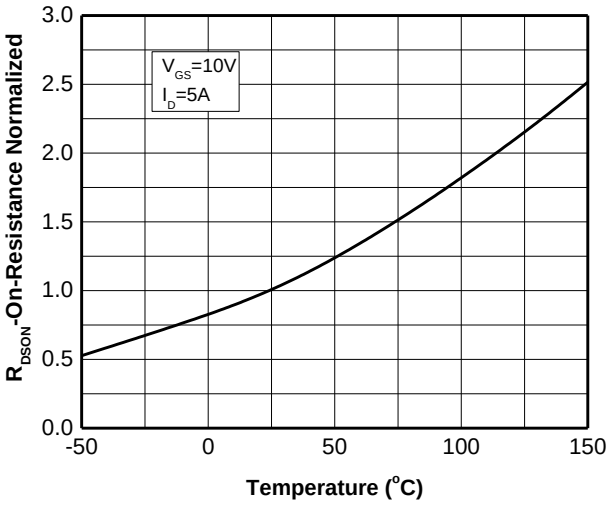
Output characteristics



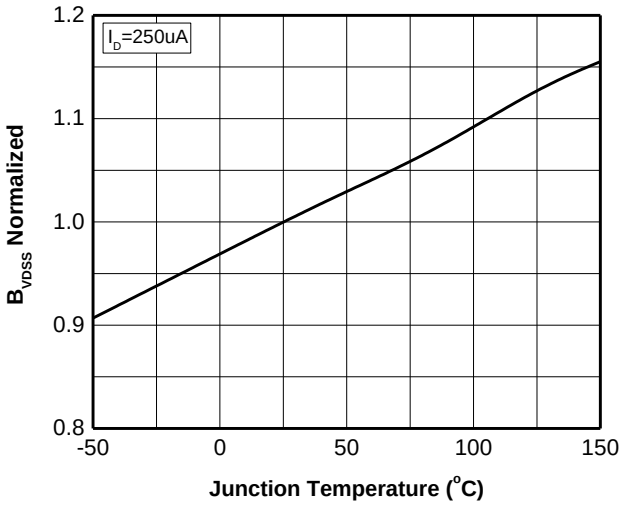
Transfer characteristics



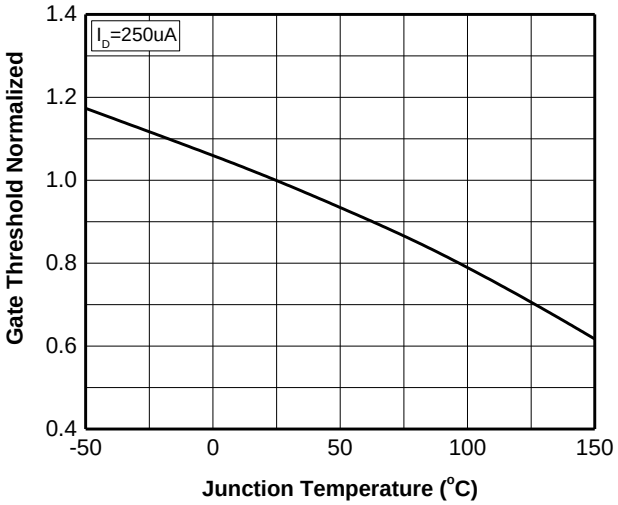
On-Resistance vs. Drain current



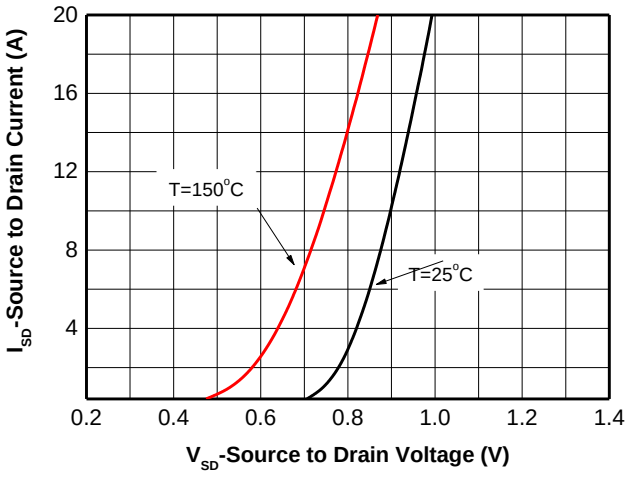
On-Resistance vs. Junction temperature



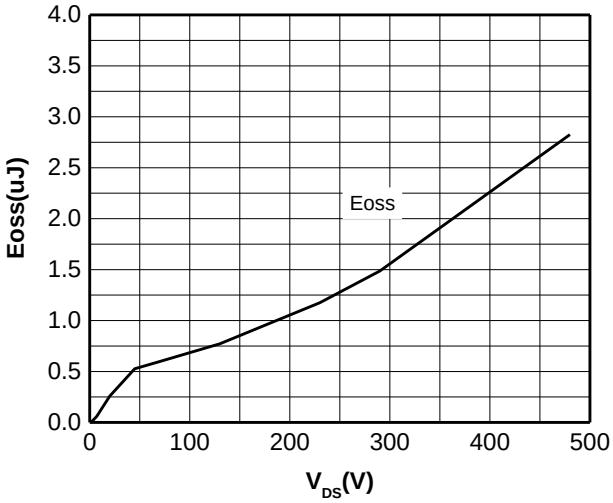
Breakdown Voltage vs. Junction temperature



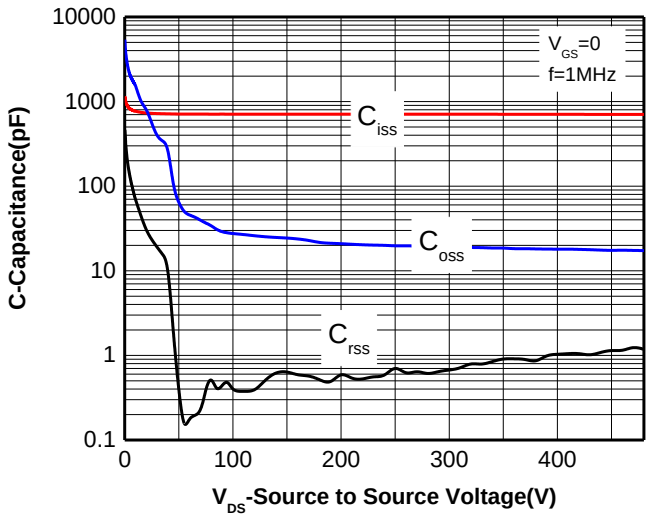
Threshold voltage vs. Junction temperature



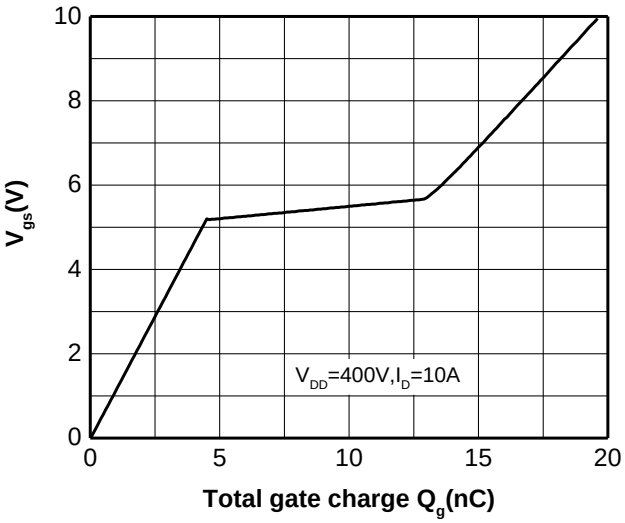
Body diode forward voltage



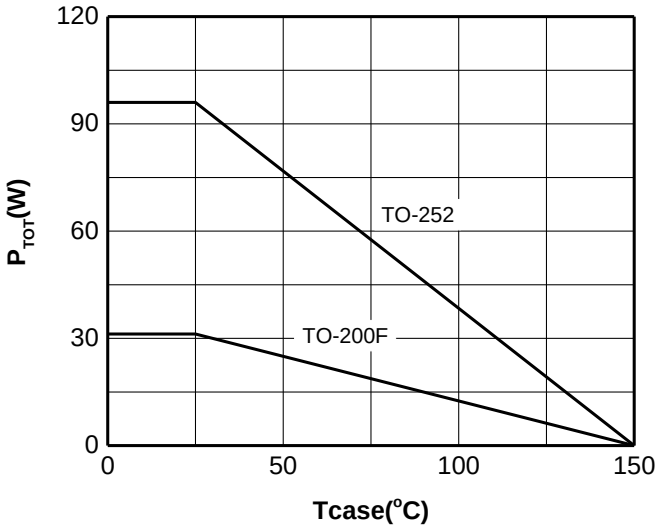
Cossstored Energy



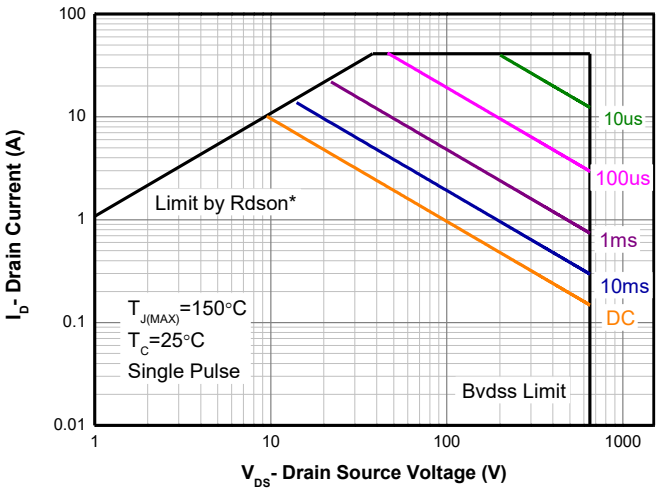
Capacitance



Gate charge Characteristics

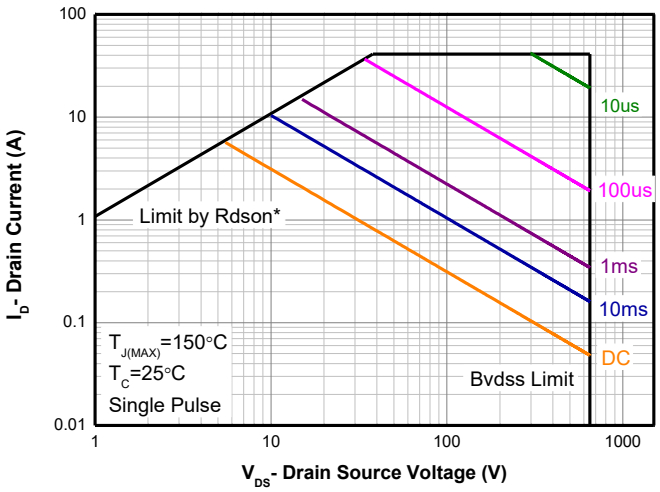


Power dissipation



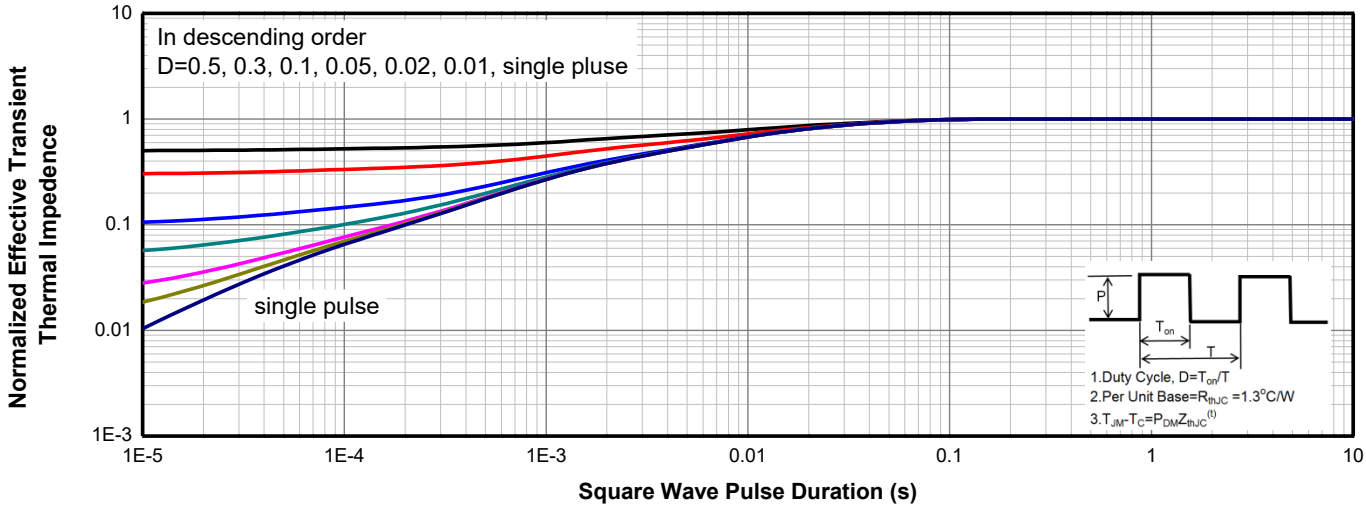
TO-252E-2

Safe operating area(Note D)

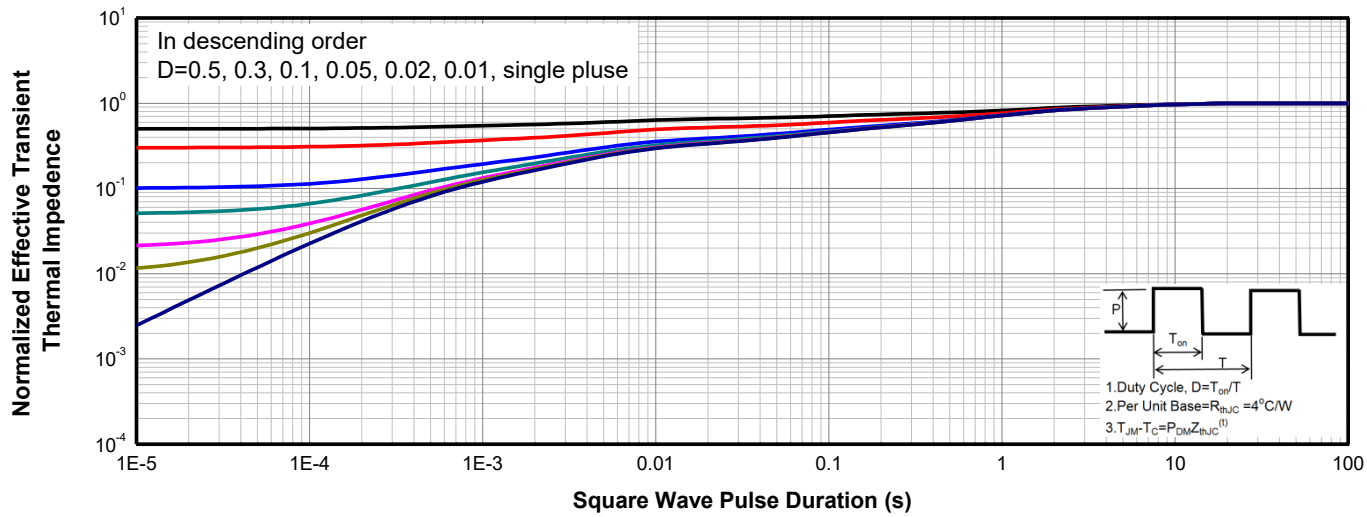


TO-220F

Safe operating area(Note D)



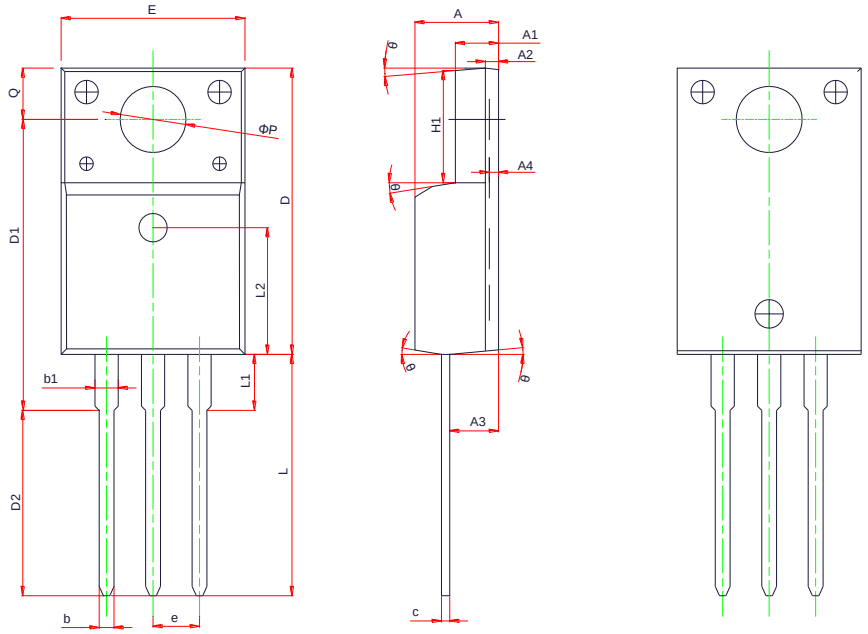
TO-252E-2 TO-220F Transient thermal response(Junction to case)



TO-220F Transient thermal response(Junction to case)(Note D)

PACKAGE OUTLINE DIMENSIONS

TO–220F–3L

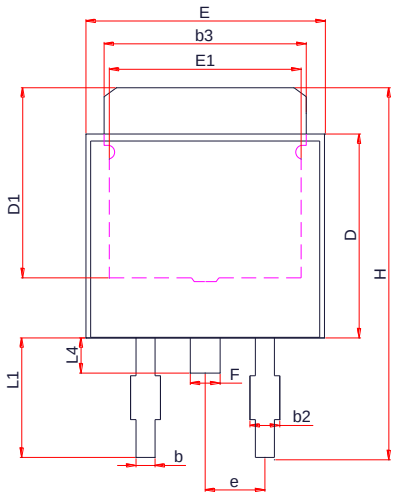


TOP VIEW SIDE VIEW BOTTOM VIEW

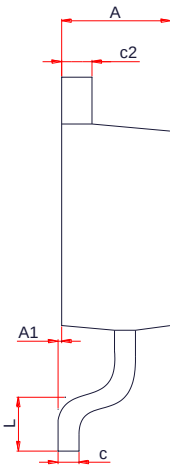
Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	4.50	4.72	4.90
A1	2.45	2.56	2.65
A2		0.72Ref	
A3	2.68	2.78	2.88
A4	-	-	0.45
b	0.70	0.80	0.90
b1	1.18	1.28	1.38
c	0.45	0.52	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
E	9.96	10.16	10.36
e		2.45BSC	
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	3.50
L2		2.54BSC	
φP	3.08	3.18	3.28
Q	3.20	-	3.40
θ	3°	5°	7°

PACKAGE OUTLINE DIMENSIONS

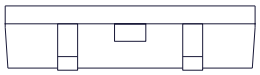
TO–252E–2L



TOP VIEW



SIDE VIEW

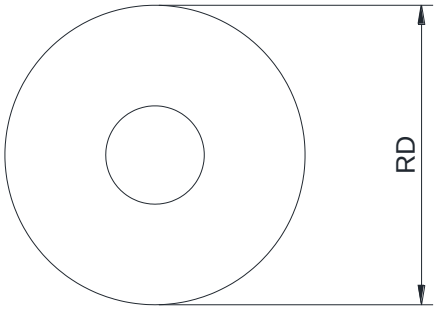


SIDE VIEW

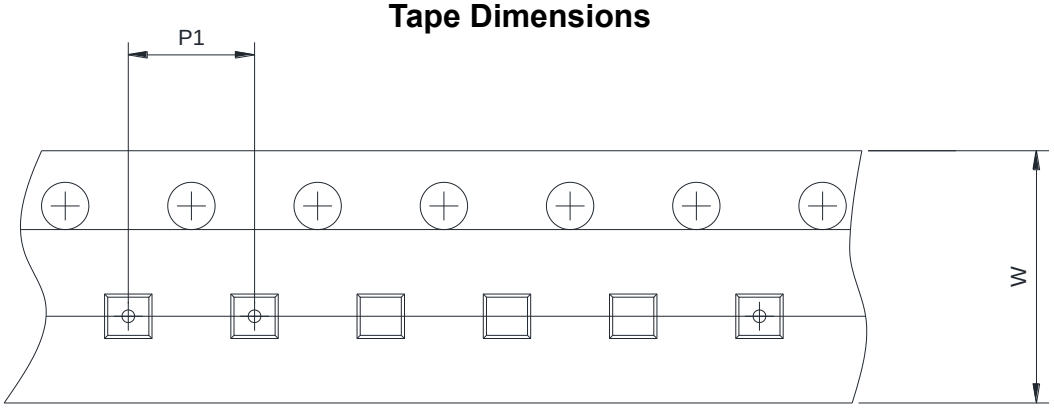
Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	2.20	2.30	2.40
A1	0	0.08	0.15
b	0.50	0.60	0.70
b2	0.60	0.75	0.90
b3	5.20	5.35	5.50
c2	0.45	0.50	0.55
c	0.51Ref		
D	5.40	5.60	5.80
D1	4.57	-	-
E	6.40	6.60	6.80
E1	3.81	-	-
e	2.30Ref		
F	0.70	0.80	0.90
H	9.40	9.80	10.20
L	1.40	1.59	1.77
L1	2.40	2.70	3.00
L4	0.80	1.00	1.20

TAPE AND REEL INFORMATION

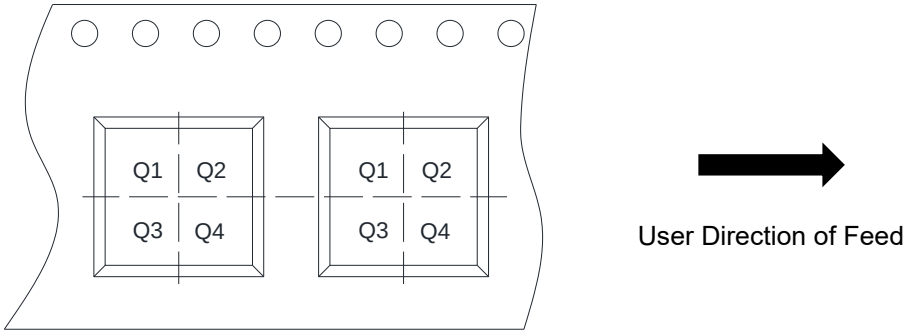
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimension	☐ 7inch ☑ 13inch
W	Overall width of the carrier tape	☐ 8mm ☐ 12mm ☑ 16mm
P1	Pitch between successive cavity centers	☐ 2mm ☑ 4mm ☑ 8mm
Pin1	Pin1 Quadrant	☐ Q1 ☑ Q2 ☐ Q3 ☐ Q4

制 修 订 记 录					
文件版本	制修日期	修订页次	修订人	变更内容	
Rev. 0.9	20180112	非正式版	衷世雄	非正式版	
Rev.1.0	20180326	正式版	衷世雄	正式版	
Rev1.1	20181008	5	解天赐	热阻	
Rev1.2	20190621	1，2	衷世雄	Eas	
批准		审核		编制	
日期		日期		日期	
各部门会签					
应用部	封装部	市场部	生产管理部		
市场部上传者/上传时间					
品质部确认者/确认时间					