

WCR1K2N65T/TF/TG

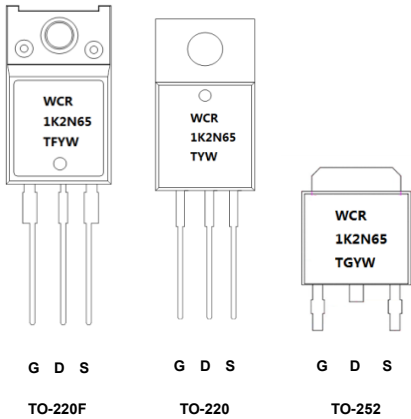
650V N-Channel Super Junction MOSFET

Description

The WCR1K2N65 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.

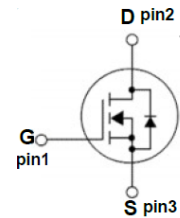
Features

- 700V@ $T_J=150^{\circ}\text{C}$
- Typ. $R_{DS(on)}=1.05\Omega$
- Low gate charge
- 100% avalanche tested
- 100% R_g tested



Order Information

Device	Package	Marking	Units/Tube	Units/Real
WCR1K2N65T-3/T	TO-220	WCR1K2N65TYW ⁽¹⁾	50	
WCR1K2N65TF-3/T	TO-220F	WCR1K2N65TFYW ⁽²⁾	50	
WCR1K2N65TG-3/TR	TO-252E-2L	WCR1K2N65TGYW ⁽³⁾		2500



Note 1: WCR1K2N65T=Device code ;Y=Year ;W=Week (A-z);
 Note 2: WCR1K2N65TF=Device code ;Y=Year ;W=Week (A-z);
 Note 3: WCR1K2N65TG=Device code ;Y=Year ;W=Week (A-z);

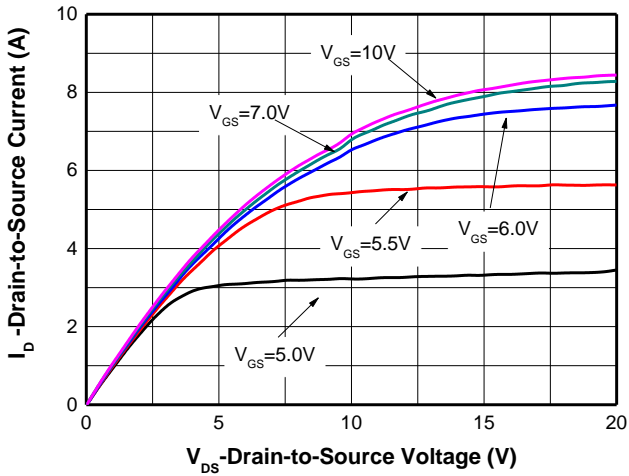
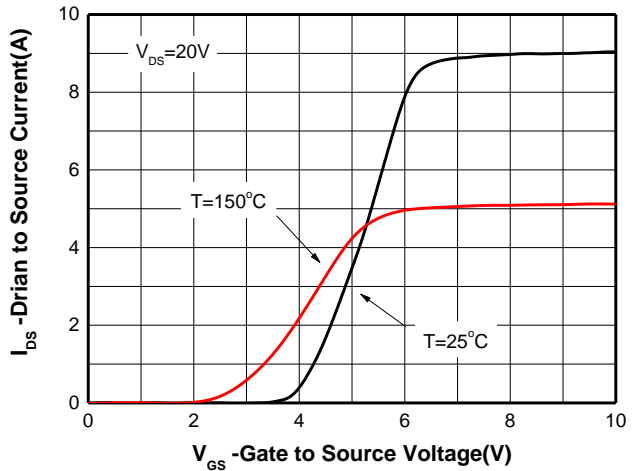
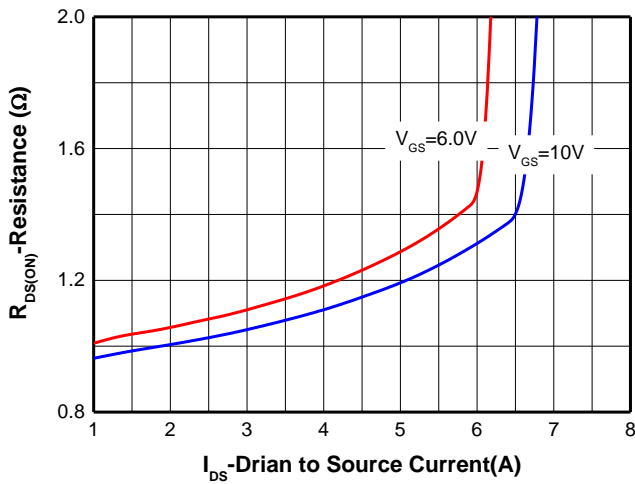
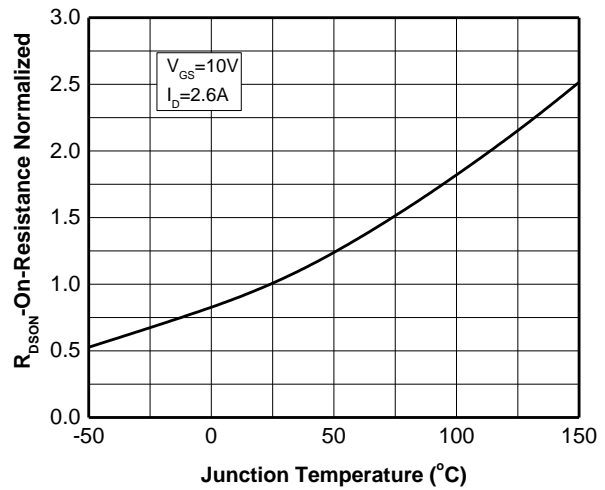
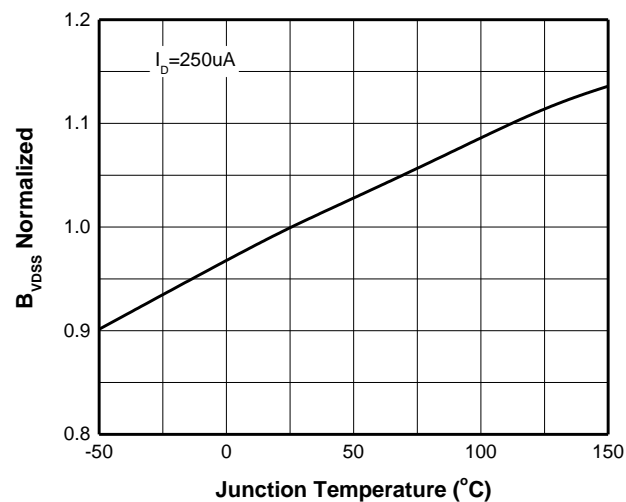
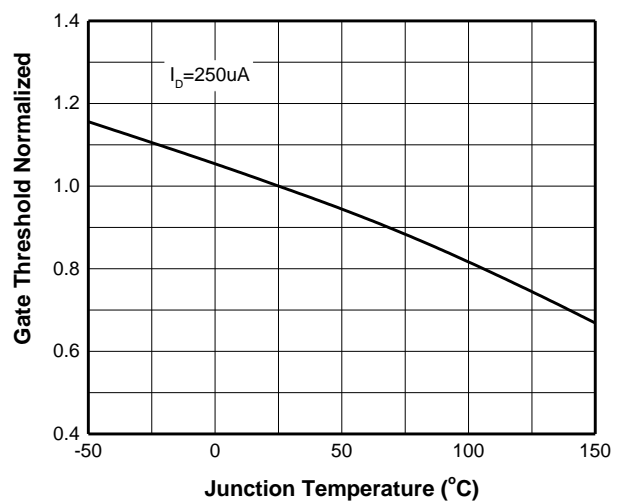
Absolusion Maximum Ratings $T_A=25^{\circ}\text{C}$ unless otherwise noted					
Parameter	Symbol	WCR1K2N65T WCR1K2N65TG	WCR1K2N65TF	Unit	
Drain-Source Voltage	V_{DS}	650		V	
Gate-Source Voltage	V_{GS}	± 30			
Continuous Drain Current ^A	I_D	$T_C=25^{\circ}\text{C}$	4.0	3	A
		$T_C=100^{\circ}\text{C}$	2.5	1.9	
Pulsed Drain Current	I_{DM}	16		A	
Single Pulsed Avalanche Energy ^B	E_{AS}	41		mJ	
Power Dissipation	P_D	$T_C=25^{\circ}\text{C}$	50	30	W
		Derate above 25°C	0.5	0.22	
Operating and Storage Temperature Range	T_J, T_{STG}	-55~150		$^{\circ}\text{C}$	
Lead Temperature	T_L	260		$^{\circ}\text{C}$	
Thermal Resistance Ratings					
Maximum Junction-to-Ambient	$R_{th(ch-A)}$	62 ^D	80	$^{\circ}\text{C/W}$	
Maximum Junction-to-Case	$R_{th(ch-c)}$	2.5	4.6		

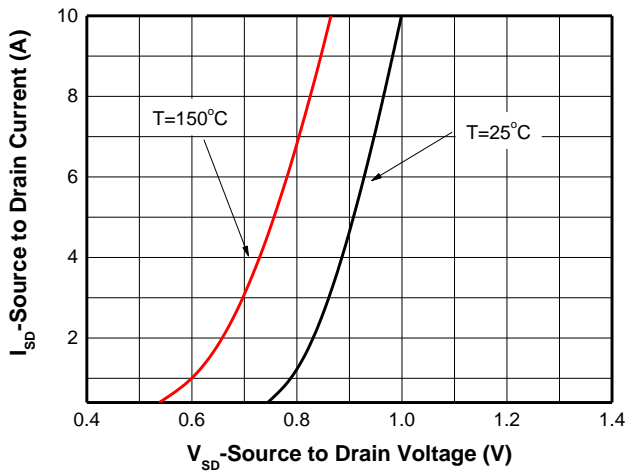
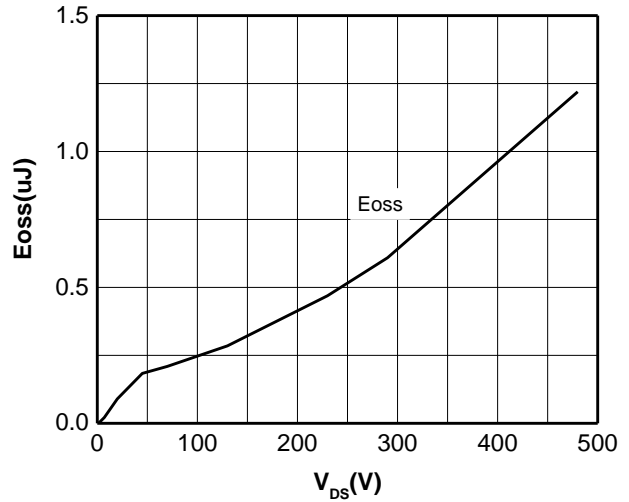
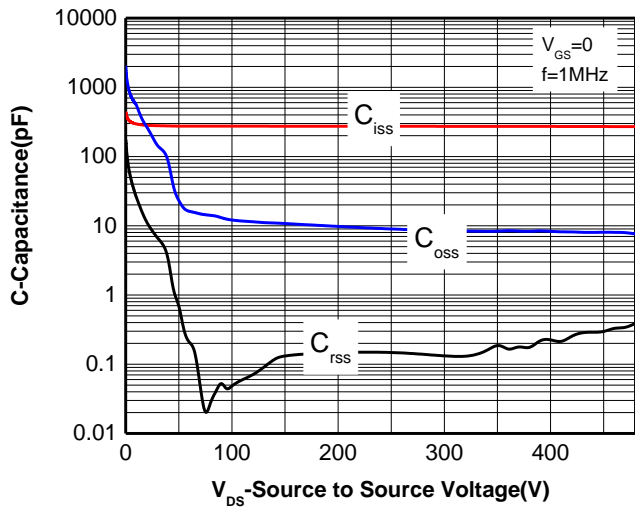
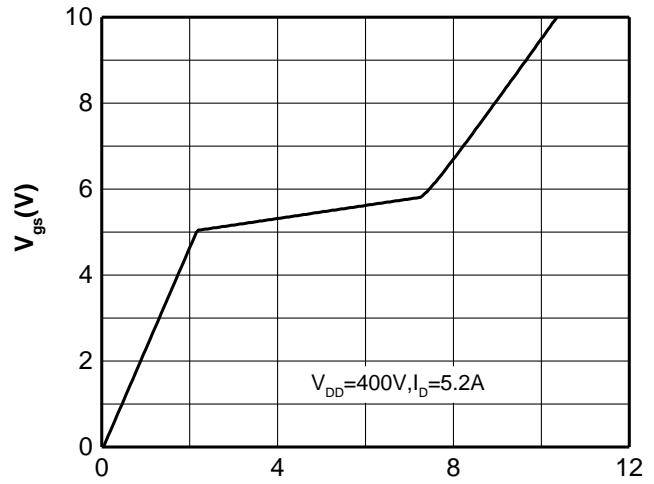
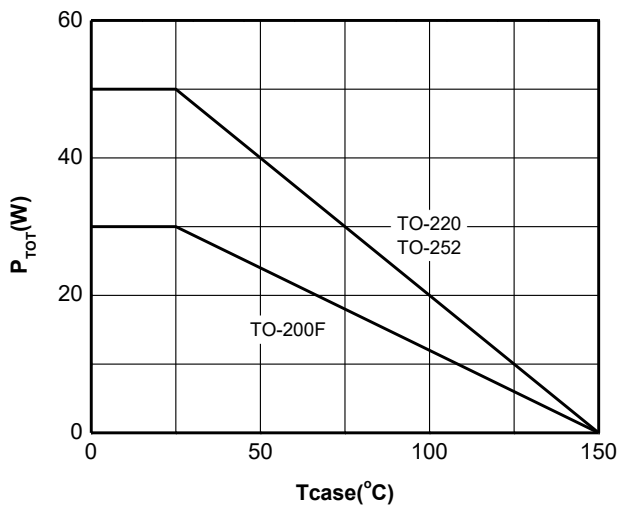
Electronics Characteristics (T_A=25°C, unless otherwise noted)

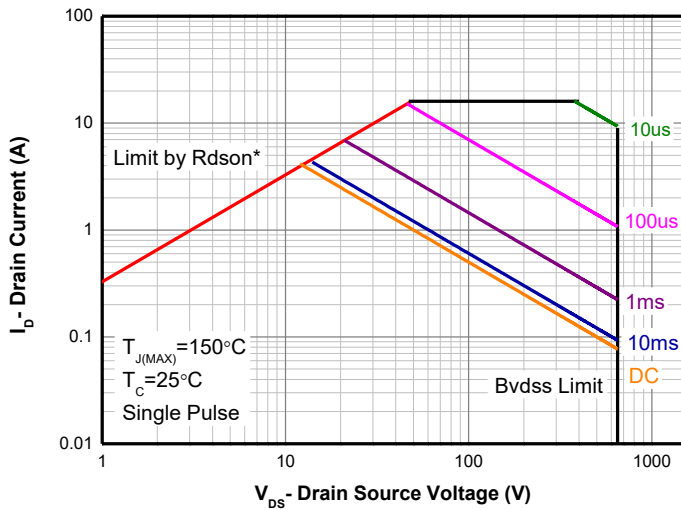
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0 V, I _D = 250uA, T _J =25°C	650			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =650V, V _{GS} = 0V, T _J =25°C			1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 150uA	2	3	4	V
Drain-to-source On-resistance	R _{DS(on)} ^C	V _{GS} = 10V, I _D = 2.6A		1.05	1.22	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 400 V		272		pF
Output Capacitance	C _{OSS}			8.3		
Reverse Transfer Capacitance	C _{RSS}			0.3		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 400 V, I _D = 5.2A		10.4		nC
Gate-to-Source Charge	Q _{GS}			2.9		
Gate-to-Drain Charge	Q _{GD}			3.9		
Gate resistance	R _g	V _{GS} =0V , F=1MHZ, drain open		10		Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(on)}	V _{GS} = 10V, V _{DS} = 400 V, I _D = 2.6A, R _G =10 Ω		8.5		ns
Rise Time	t _r			12.7		
Turn-Off Delay Time	t _{d(off)}			22.4		
Fall Time	t _f			16.7		
Drain to Source Diode Characteristics and Maximum Ratings						
Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 5.2A			1.5	V
Body-Diode Continuous Current	I _S			5.2		A
Body-Diode Pulsed Current	I _{SM}			20.8		A
Body Diode Reverse Recovery Time	T _{rr}	I _F =2.6A, di/dt=100A/us, V _{DS} =400V		171		nS
Body Diode Reverse Recovery Charge	Q _{rr}			0.75		uC
Peak reverse recovery Current	I _{rrm}			8.8		A

NOTES:

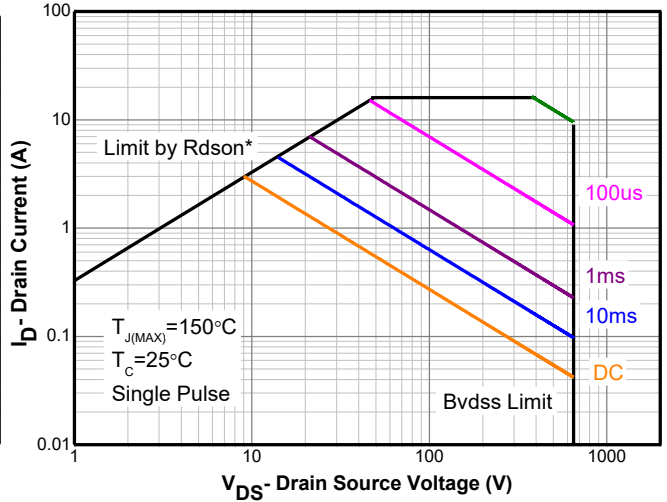
- Drain current limited by maximum junction temperature. Maximum duty cycle D=0.75
- L=100mH, I_{AS}=0.9A, V_{DD}=50V, Starting T_J=25°C
- Pulse Test: Pulse width ≤300us, Duty Cycle ≤2% sensitively Independent of Operating Temperature Typical Characteristics
- These tests are performed with the device mounted on 1 in₂ FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.

Typical Characteristics ($T_A=25^\circ\text{C}$, 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

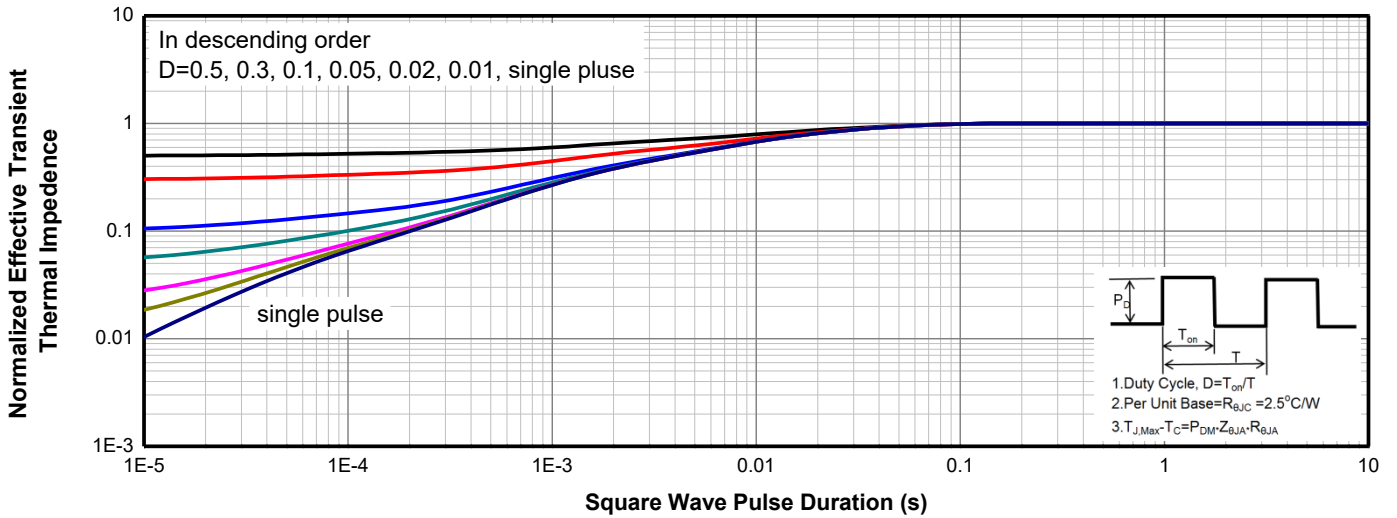

Body diode forward voltage

Cosstored Energy

Capacitance

Gate charge Characteristics

Power dissipation



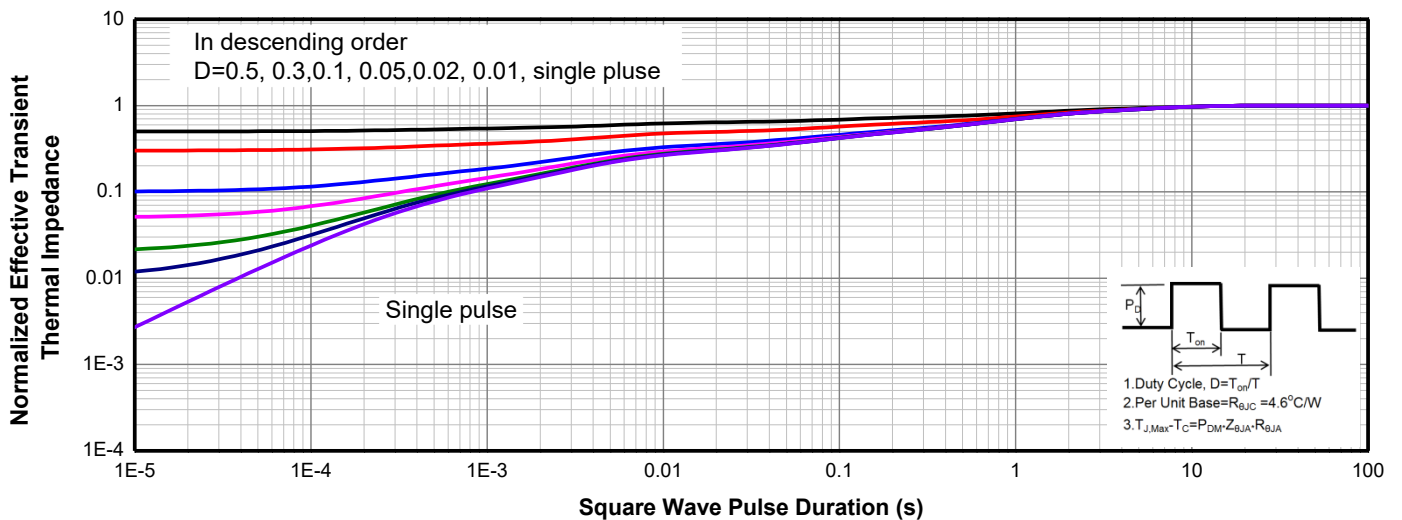
TO-220&TO-252E-2
Safe operating area(Note D)



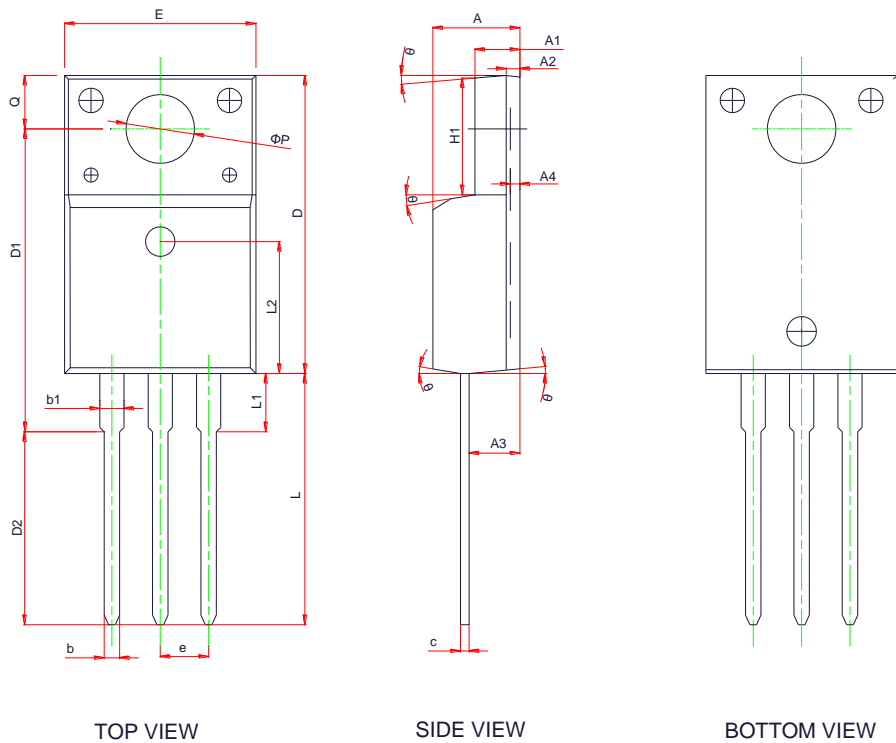
TO-220F
Safe operating area(Note D)



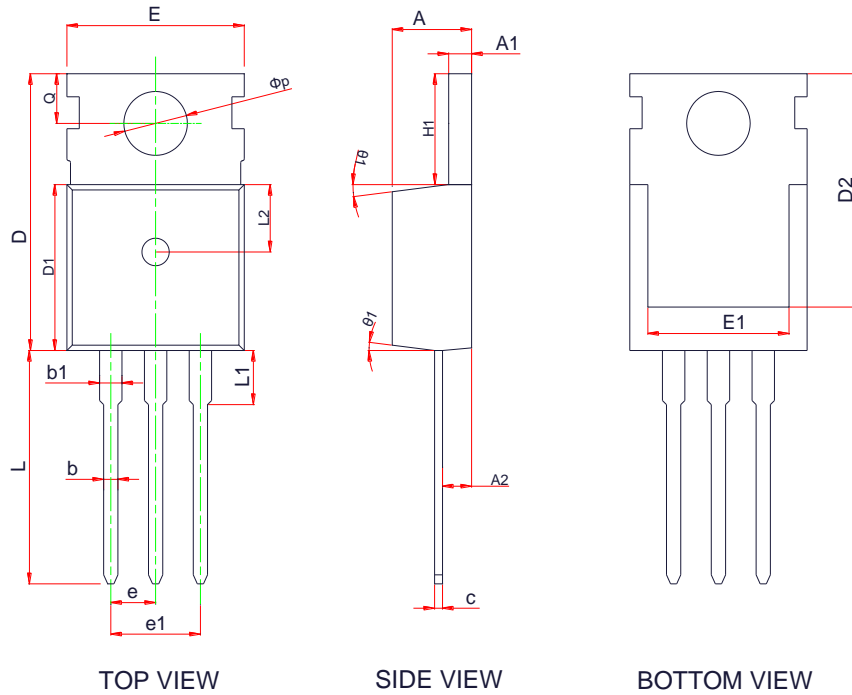
TO-220&TO-252E-2 Transient thermal response(Junction to case)



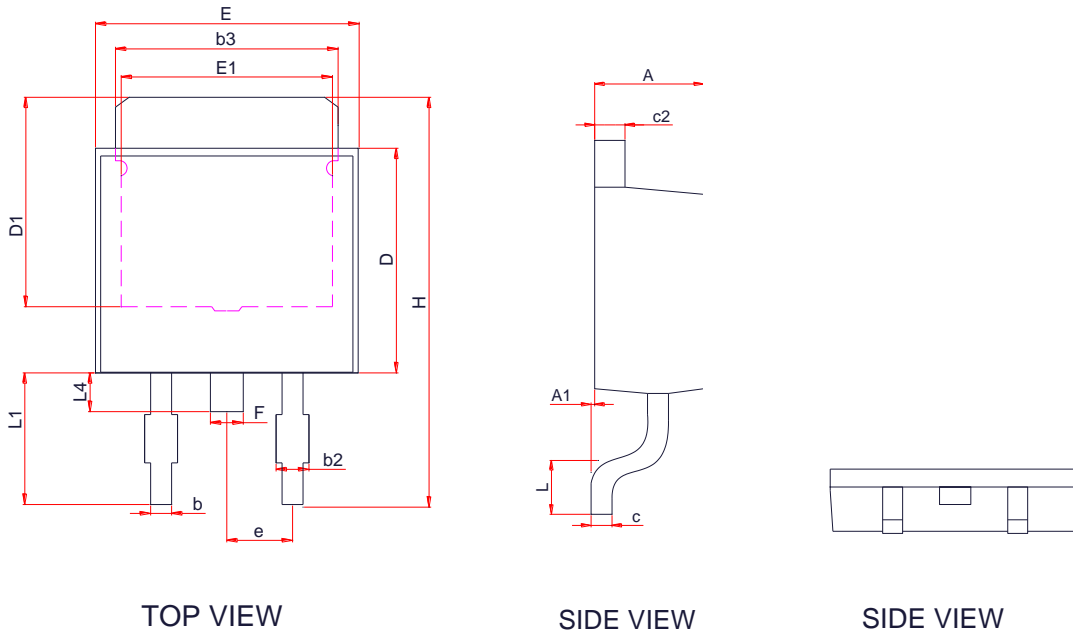
TO-220F Transient thermal response(Junction to case)

PACKAGE OUTLINE DIMENSIONS
TO-220F-3L


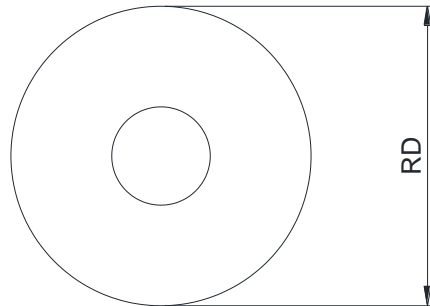
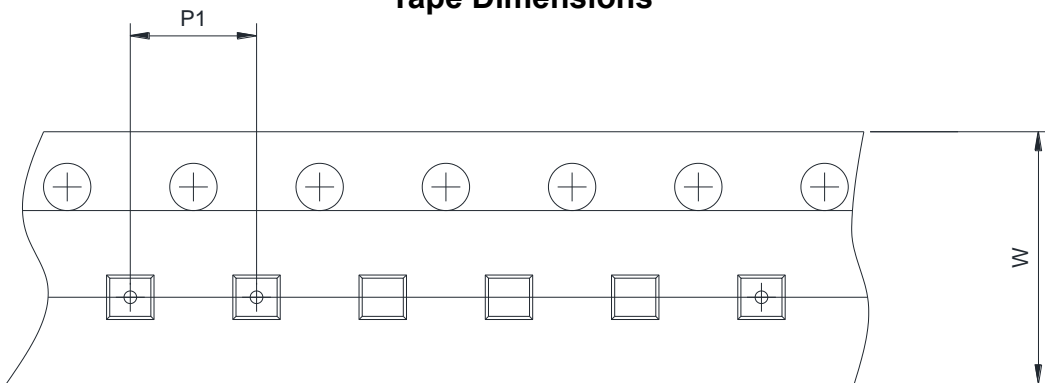
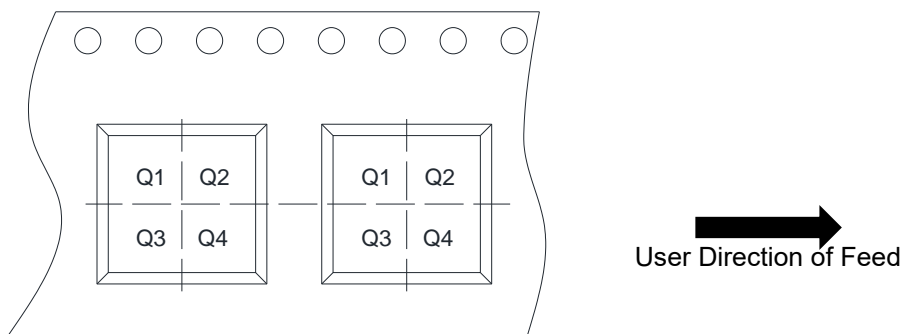
Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	4.50	4.72	4.90
A1	2.45	2.56	2.65
A2	0.72Ref		
A3	2.68	2.78	2.88
A4	-	-	0.45
b	0.70	0.80	0.90
b1	1.18	1.28	1.38
c	0.45	0.52	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
E	9.96	10.16	10.36
e	2.45BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	3.50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

PACKAGE OUTLINE DIMENSIONS
TO-220-3L


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	0.80	0.90
b1	1.30	-	1.37
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	12.90	13.10	13.30
E	9.70	9.90	10.20
E1	7.70	7.90	8.10
e	2.45Ref		
e1	5.08Ref		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	-	-	3.50
L2	4.06Ref		
ØP	3.55	3.60	3.65
Q	2.73	-	2.87
θ1	3°	5°	7°

PACKAGE OUTLINE DIMENSIONS
TO-252E-2L


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	<input type="checkbox"/> 7inch	<input checked="" type="checkbox"/> 13inch
W	Overall width of the carrier tape	<input type="checkbox"/> 8mm	<input type="checkbox"/> 12mm <input checked="" type="checkbox"/> 16mm
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input type="checkbox"/> 4mm <input checked="" type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input type="checkbox"/> Q1	<input checked="" type="checkbox"/> Q2 <input type="checkbox"/> Q3 <input type="checkbox"/> 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	20181019	正式版	解天赐	正式版	
Rev1.1	20190618	1,2,5	衷世雄	热阻, Eas, SOA 曲线	
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					