

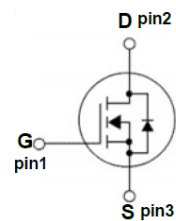
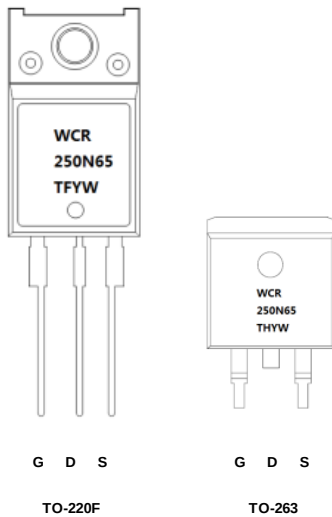
WCR250N65TF/TH 650V N-Channel Super Junction MOSFET

Description

The WCR250N65 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. $R_{DS(on)}=0.21\Omega$
- Low gate charge
- 100% avalanche tested
- 100% R_g tested



Order Information

Device	Package	Marking	Units/Tube	Units/Real
WCR250N65TF-3/T	TO-220F	WCR250N65TFYW ⁽¹⁾	50	
WCR250N65TH-3/TR	TO-263E-2L	WCR250N65THYW ⁽²⁾		800

Note 1: WCR250N65TF=Device code ;Y=Year ;W=Week (A~z);

Note 2: WCR250N65TH=Device code ;Y=Year ;W=Week (A~z);

Absolution Maximum Ratings $T_A=25^0C$ unless otherwise noted					
Parameter		Symbol	WCR250N65TH	WCR250N65TF	Unit
Drain-Source Voltage		V_{DS}	650		V
Gate-Source Voltage		V_{GS}	± 30		
Continuous Drain Current ^A	$T_C=25^0C$	I_D	13.8	7.9	A
	$T_C=100^0C$		10	5	
Pulsed Drain Current		I_{DM}	55		A
Single Pulsed Avalanche Energy ^B		E_{AS}	288		mJ
Power Dissipation	$T_C=25^0C$	P_D	125	39	W
	Derateabove 25^0C		1	0.31	W/ 0C
Operating and Storage Temperature Range		T_J, T_{STG}	-55~150		0C
Lead Temperature		T_L	260		0C
Thermal Resistance Ratings					
Maximum Junction-to-Ambient		$R_{\theta JA}$	62^D	80	$^0C/W$
Maximum Junction-to-Case		$R_{\theta JC}$	1	3.2	

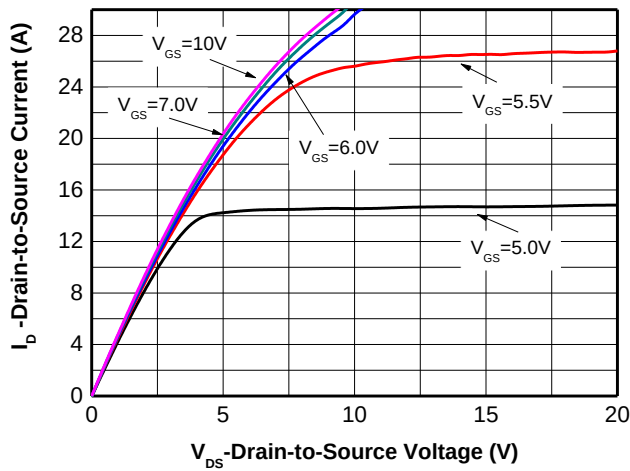
Electronics Characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)

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 = 500uA	2	3	4	V
Drain-to-source On-resistance	R _{DS(on)} ^C	V _{GS} = 10V, I _D = 6.9A		0.21	0.25	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz,V _{DS} = 400 V		1206		pF
Output Capacitance	C _{OSS}			29.7		
Reverse Transfer Capacitance	C _{RSS}			1.5		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V,V _{DS} = 400 V, I _D = 13.8A		31.3		nC
Gate-to-Source Charge	Q _{GS}			7.8		
Gate-to-Drain Charge	Q _{GD}			12.4		
Gate resistance	R _g	V _{GS} =0V ,F=1MHZ,drain open		6.2		Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(on)}	V _{GS} = 10V, V _{DS} = 400 V, I _D = 6.9A,R _G =10 Ω		16.5		ns
Rise Time	t _r			16.2		
Turn-Off Delay Time	t _{d(off)}			67		
Fall Time	t _f			19.5		
Drain to Source Diode Characteristics and Maximum Ratings						
Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 13.8A			1.5	V
Body-Diode Continuous Current	I _S			13.8		A
Body-Diode Pulsed Current	I _{SM}			55		A
Body Diode Reverse Recovery Time	T _{rr}	I _F =6.9A,dI/dt=100A/us,V _{DS} =400V (NOTE D)		285		nS
Body Diode Reverse Recovery Charge	Q _{rr}			2.6		uC
Peak reverse recovery Current	I _{rrm}			18.2		A

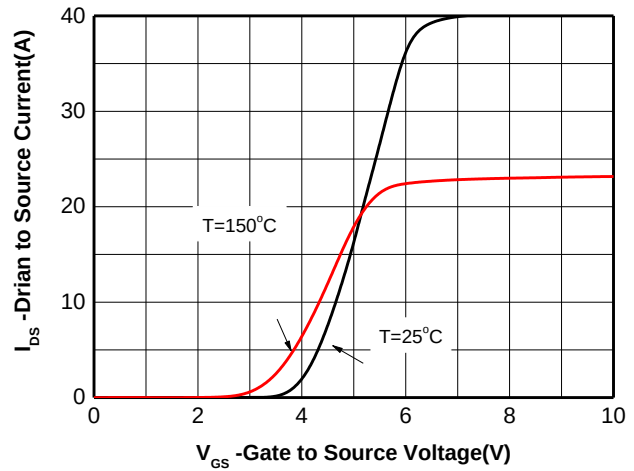
NOTES:

- A. Drain current limited by maximum junction temperature. Maximum duty cycle $D=0.75$
- B. $L=100\text{mH}, I_{AS}=2.4\text{A}, V_{DD}=50\text{V}$, Starting $T_J=25^{\circ}\text{C}$
- C. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$ sensitively Independent of Operating Temperature Typical Characteristics
- D. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$.

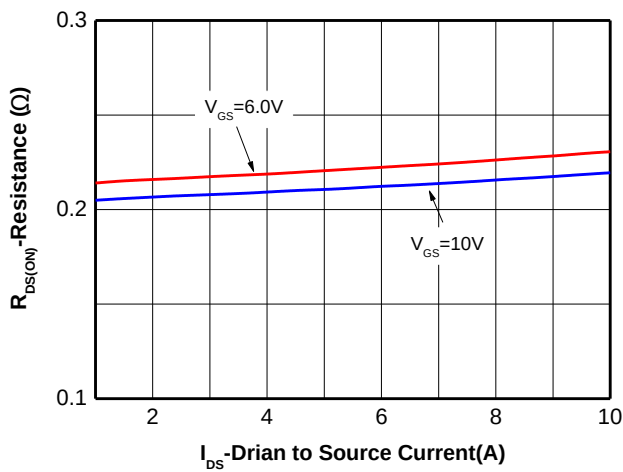
Typical Characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)



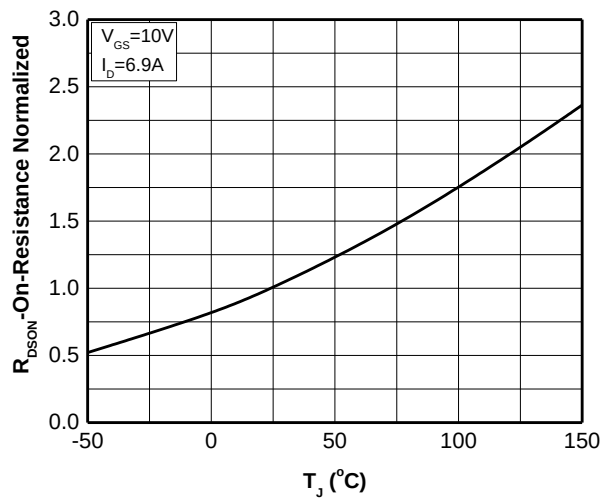
Output characteristics



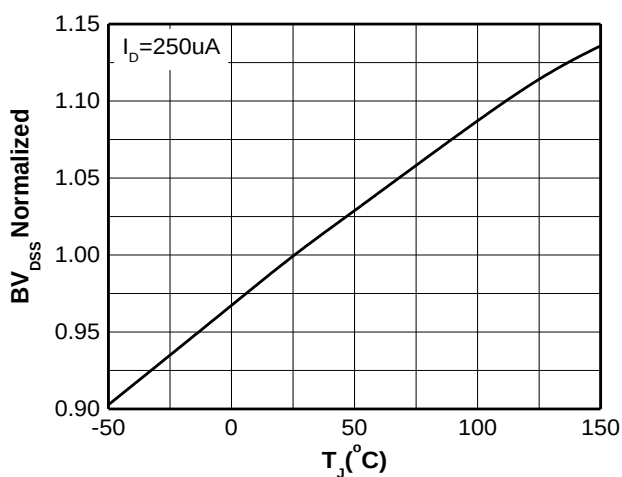
Transfer characteristics



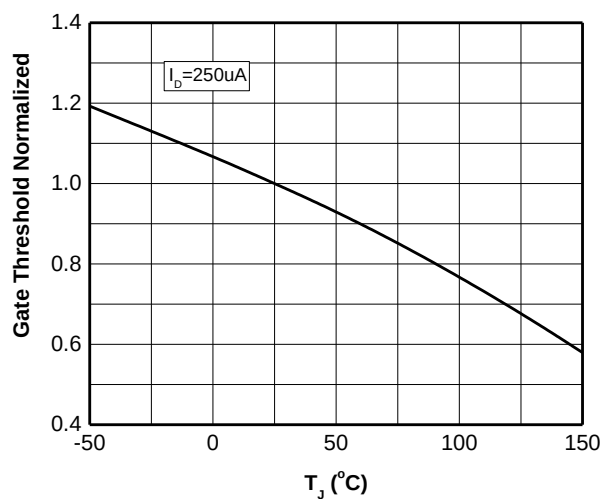
On-Resistance vs. Drain current



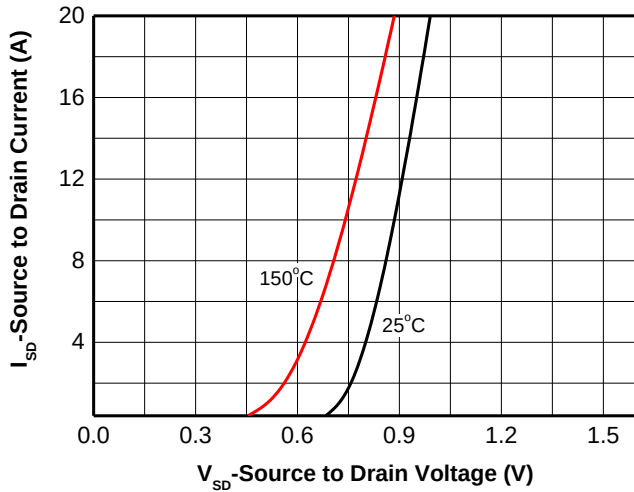
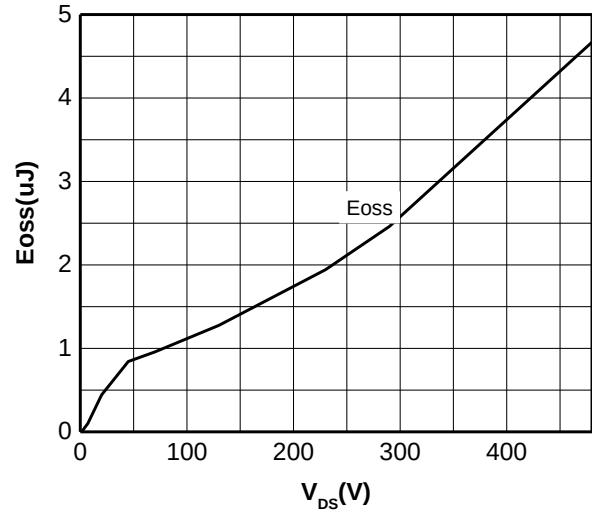
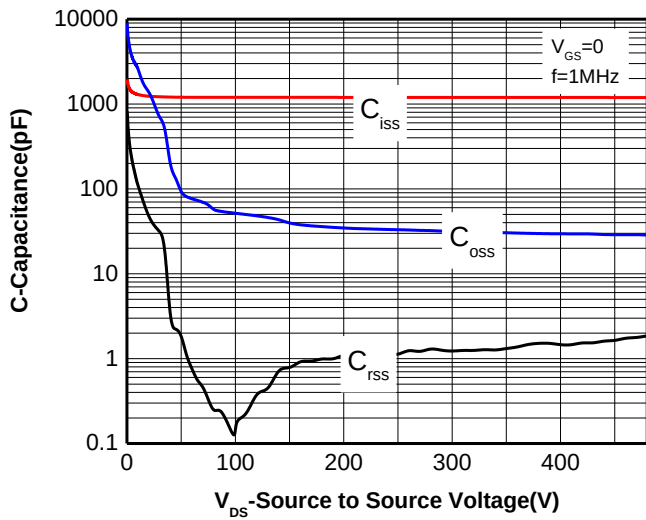
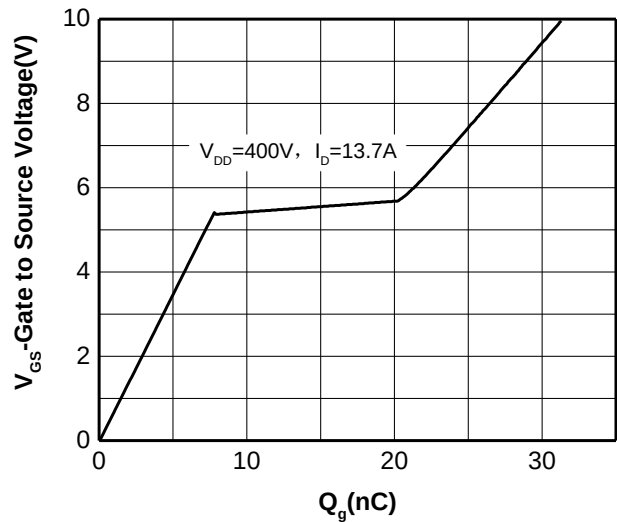
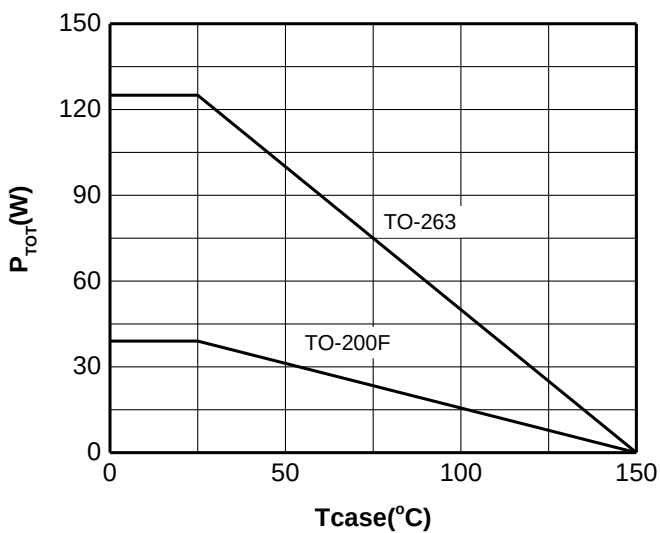
On-Resistance vs. Junction temperature

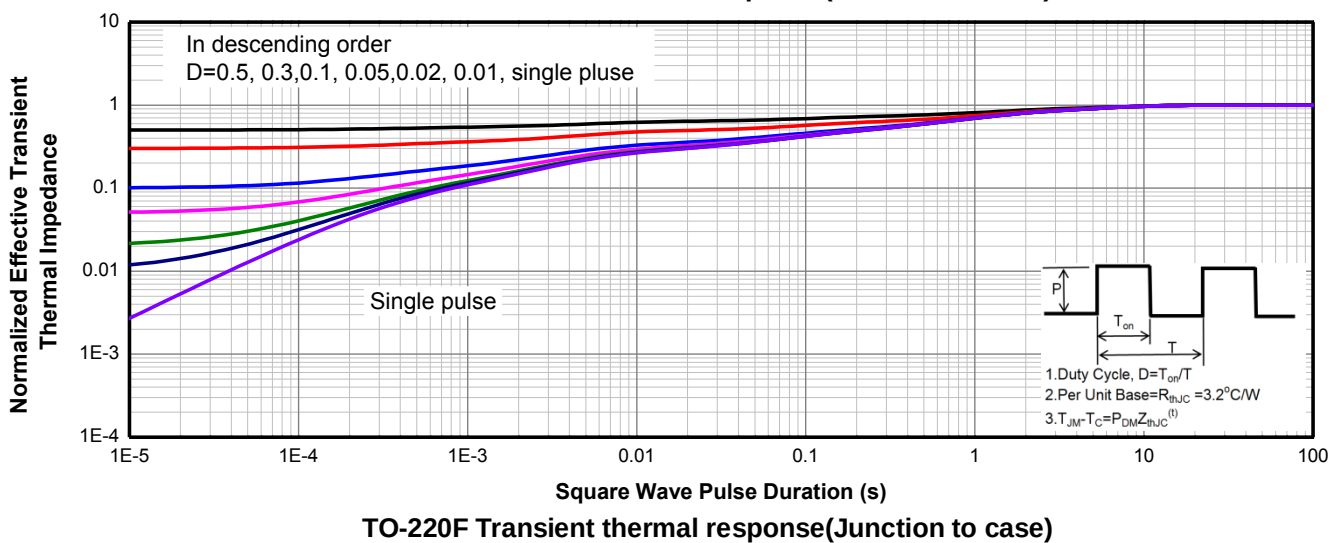
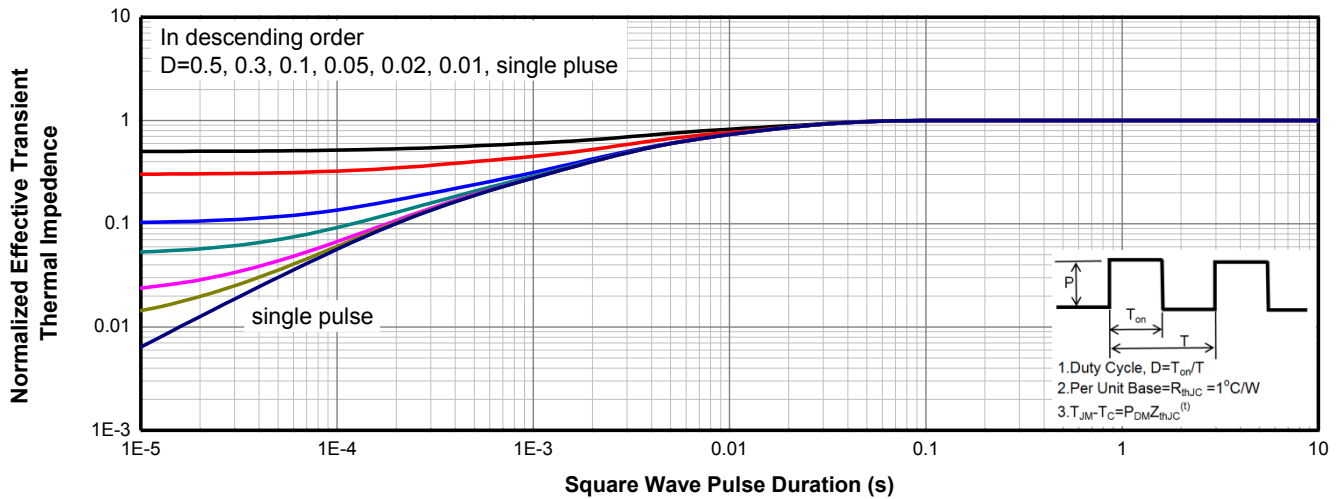
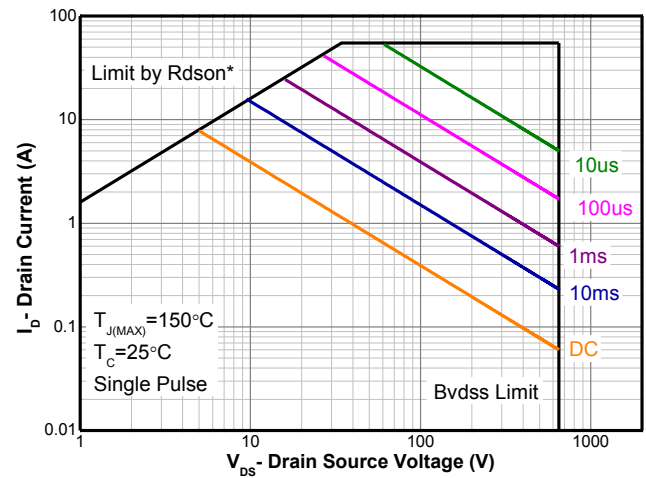
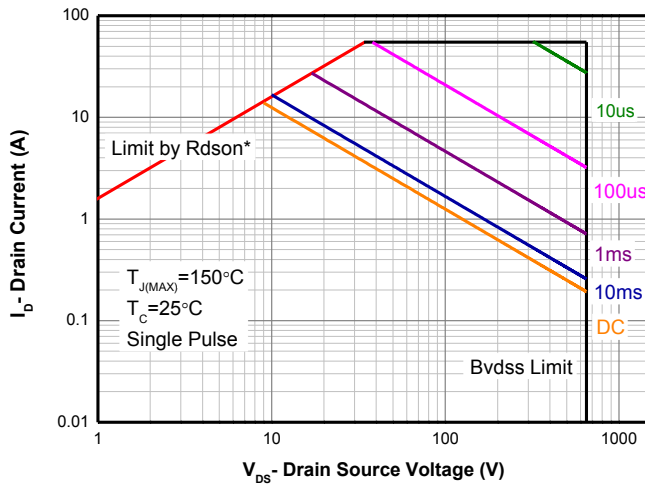


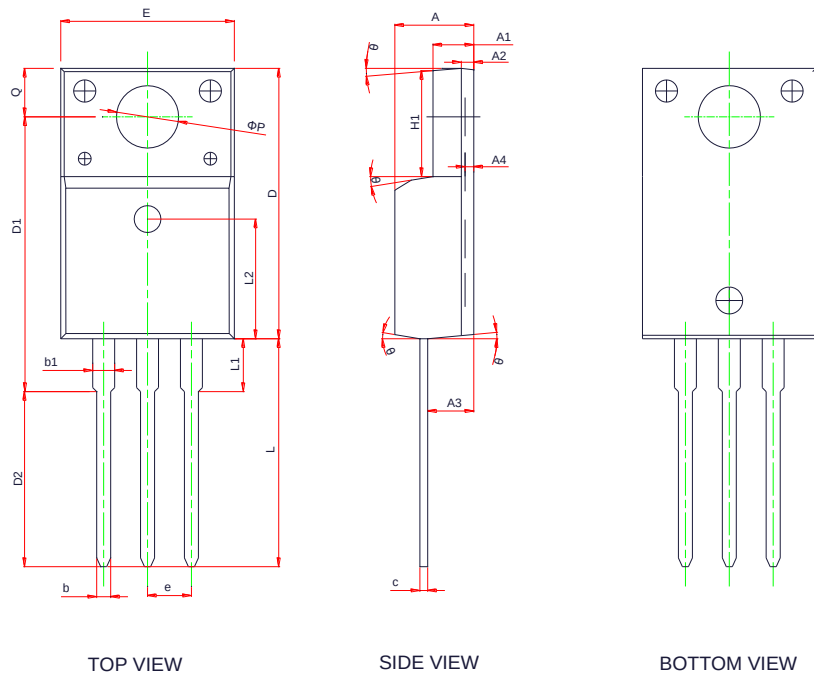
Breakdown Voltage vs. Junction temperature



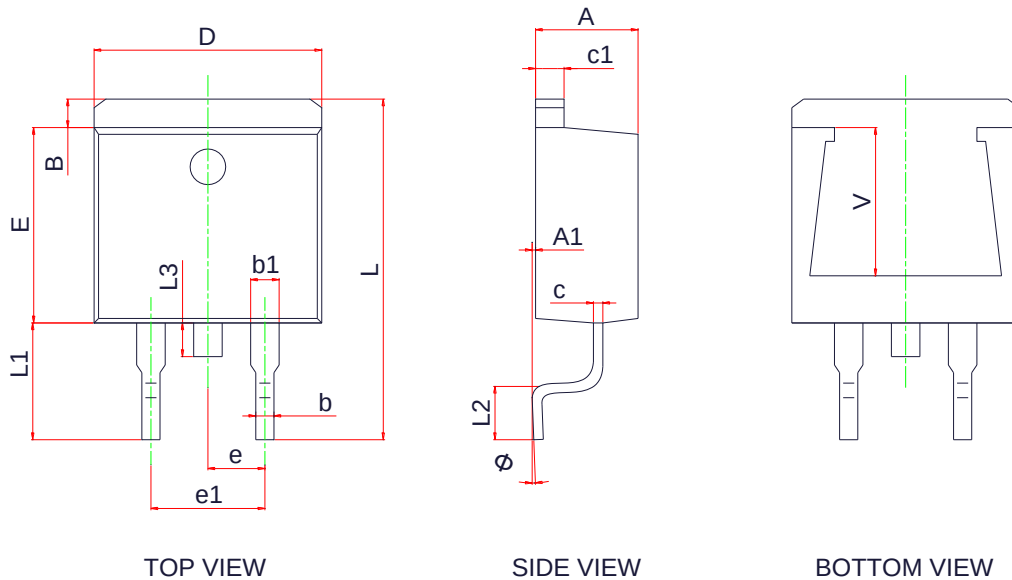
Threshold voltage vs. Junction temperature


Body diode forward voltage

Cossstored Energy

Capacitance

Gate charge Characteristics

Power dissipation

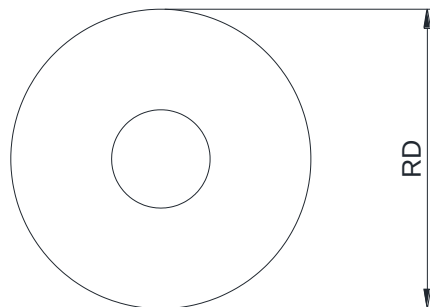
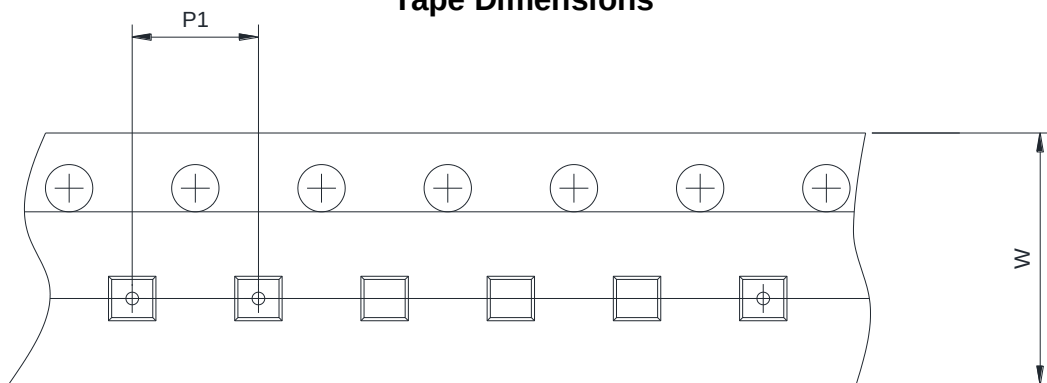
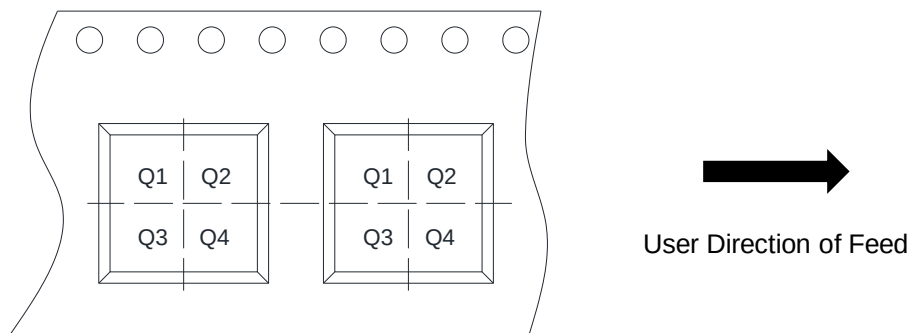


PACKAGE OUTLINE DIMENSIONS
TO-220F-3L


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-263E-2L


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	4.47	4.57	4.67
A1	0.00	-	0.15
B	1.12	1.27	1.42
b	0.71	0.81	0.91
b1	1.17	1.27	1.37
c	0.31	0.42	0.53
c1	1.17	1.27	1.37
D	10.01	10.16	10.31
E	8.50	8.70	8.90
e	2.54Ref		
e1	4.98	5.08	5.18
L	14.94	15.22	15.50
L1	4.95	5.20	5.45
L2	2.34	2.54	2.74
L3	1.30	1.50	1.70
Φ	0°		8°
V	6.60Ref		

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	☒ 24mm
P1	Pitch between successive cavity centers	☐ 2mm	☐ 4mm	☐ 8mm	☒ 16mm
Pin1	Pin1 Quadrant	☐ Q1	☒ Q2	☐ Q3	☐ Q4