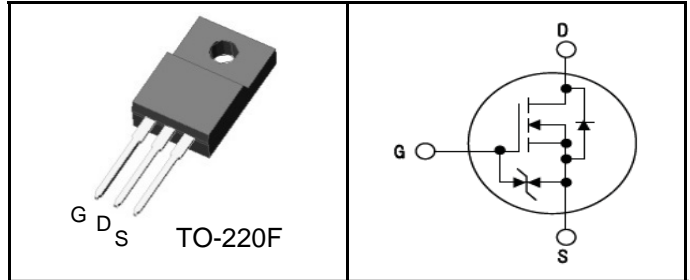


### Features

- $BV_{DSS}=650V$ ,  $I_D=30A$
- $R_{DS(on)} : 0.130\Omega$  (Max) @  $V_{GS}=10V$
- Very Low FOM ( $R_{DS(on)} \times Q_g$ )
- Extremely low switching loss
- Excellent stability and uniformity
- 100% Avalanche Tested
- Built-in ESD Diode



### Application

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- AC to DC Converters
- Telecom, Solar



### Device Marking and Package Information

Ordering code	Package	Marking
WTM30N65AF	TO-247	30N65AF XX YYWW

### Absolute Maximum Ratings $T_C=25^\circ C$ unless otherwise specified

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain-Source Voltage	650	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ C$ )	30.0	A
	Drain Current - Continuous ( $T_C = 100^\circ C$ )	15.8	A
$I_{DM}^{(1)}$	Drain Current - Pulsed	80	A
$E_{AS}^{(2)}$	Single Pulsed Avalanche Energy	454	mJ
$I_{AR}$	Avalanche Current	3.1	A
dv/dt	MOSFET dv/dt ruggedness, $V_{DS}=0\dots 400V$	50	V/ns
dv/dt	Reverse diode dv/dt, $V_{DS}=0\dots 400V$ , $I_{DS}\leq I_D$	15	V/ns
$P_D$	Power Dissipation ( $T_C = 25^\circ C$ )	179	W
$V_{ESD(G-S)}$	Gate source ESD(HBM-C=100pF, R=1.5K $\Omega$ )	2000	V
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ C$

### Thermal Resistance Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.7	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	$^\circ C/W$

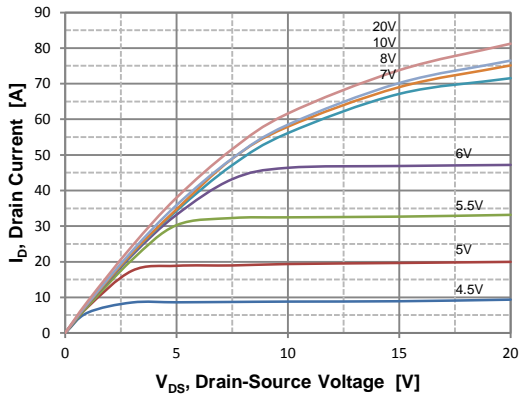
### Electrical Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>On Characteristics</b>						
$V_{GS}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 1.1\text{ mA}$	2.0	-	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 10.2\text{ A}$	-	115	130	m $\Omega$
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	650	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0$	-	-	1	$\mu\text{A}$
		$V_{DS} = 650\text{ V}, T_C = 150^\circ\text{C}$	-	-	100	$\mu\text{A}$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	-	-	$\pm 1$	$\mu\text{A}$
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	-	2840	-	pF
$C_{oss}$	Output Capacitance		-	61	-	pF
$C_{riss}$	Reverse Transfer Capacitance		-	3.8	-	pF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Time	$V_{DS} = 325\text{ V}, I_D = 14.3\text{ A},$ $R_G = 25\ \Omega$  (Note 3,4)	-	56	-	ns
$t_r$	Turn-On Rise Time		-	31	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	250	-	ns
$t_f$	Turn-Off Fall Time		-	20	-	ns
$Q_g$	Total Gate Charge	$V_{DS} = 520\text{ V}, I_D = 14.3\text{ A},$ $V_{GS} = 10\text{ V}$  (Note 3,4)	-	65	-	nC
$Q_{gs}$	Gate-Source Charge		-	12	-	nC
$Q_{gd}$	Gate-Drain Charge		-	19	-	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current		-	-	30	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current		-	-	80	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 14.3\text{ A}$	-	-	1.3	V
$t_{rr}$	Reverse Recovery Time	$V_R = 400\text{ V}, I_F = 14.3\text{ A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$	-	450	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	7.8	-	$\mu\text{C}$

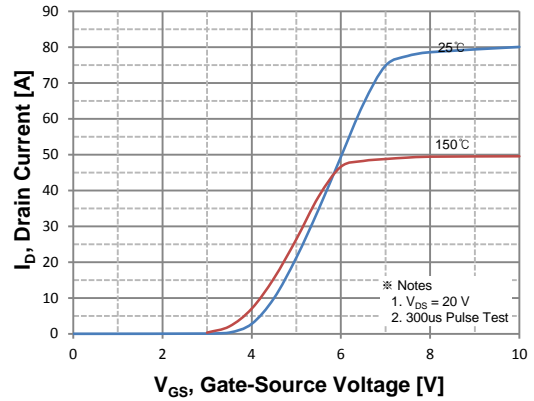
#### Notes :

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $I_{AS}=3.1\text{ A}$   $V_{DD}=100\text{ V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J=25^\circ\text{C}$
3. Pulse Test : Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$
4. Essentially Independent of Operating Temperature

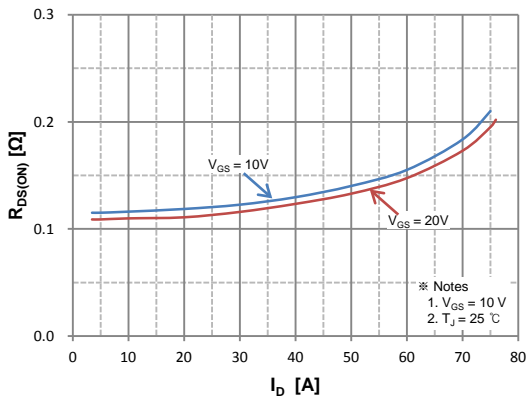
**Typical Characteristics**



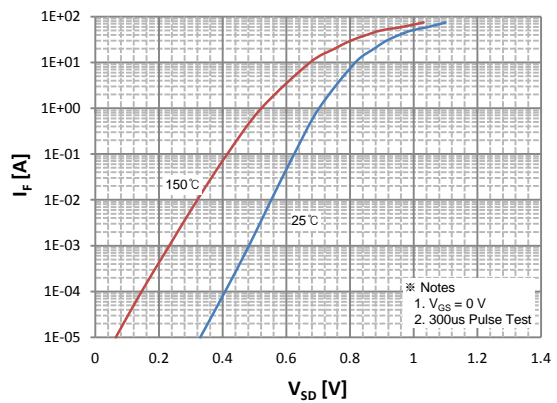
**Figure 1. On Region Characteristics**



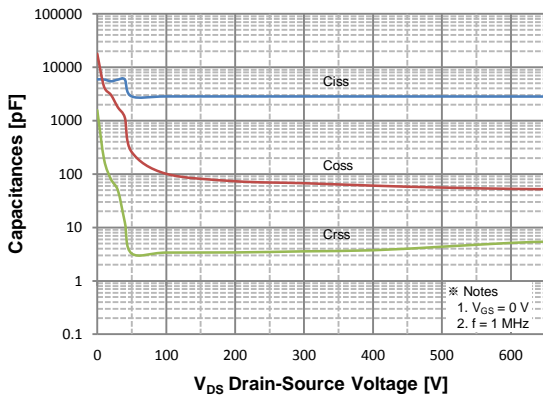
**Figure 2. Transfer Characteristics**



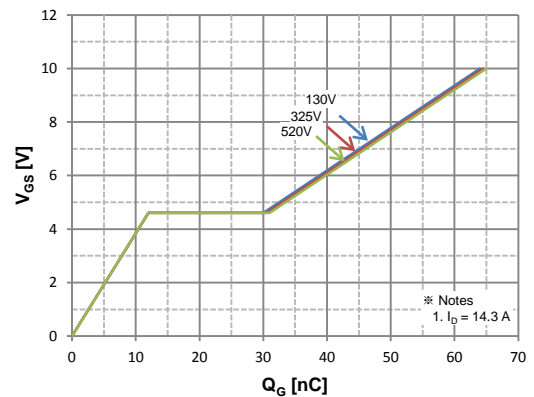
**Figure 3. On Resistance Variation vs Drain Current and Gate Voltage**



**Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature**

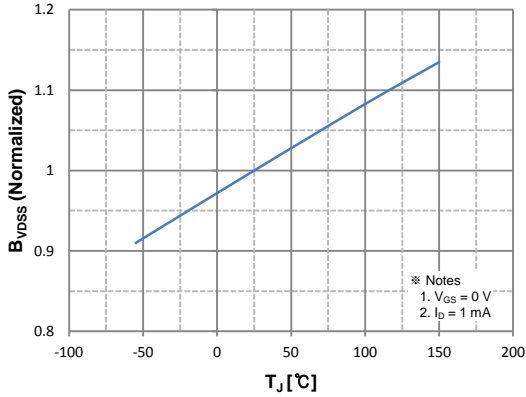


**Figure 5. Capacitance Characteristics**

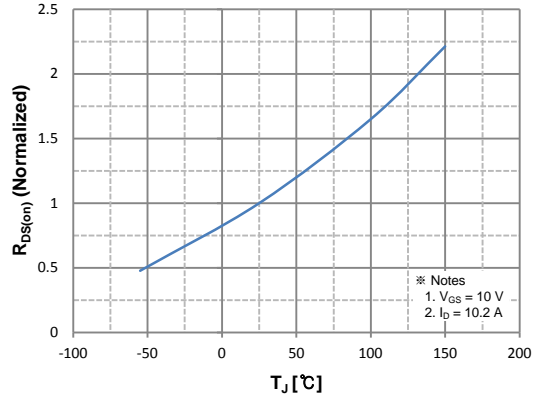


**Figure 6. Gate Charge Characteristics**

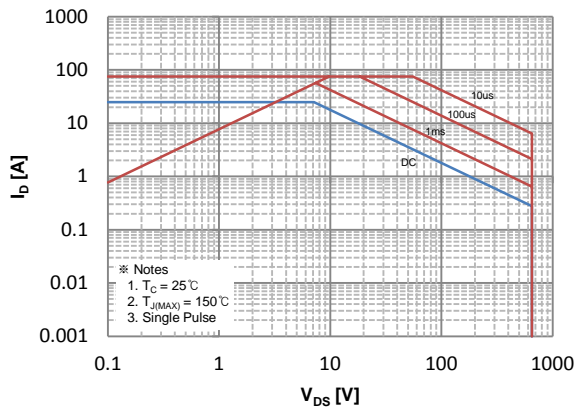
**Typical Characteristics**



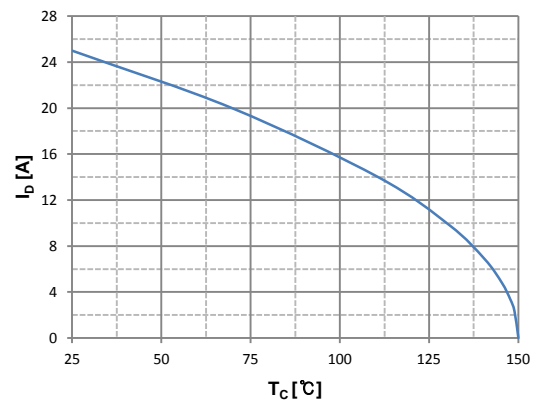
**Figure 7. Breakdown Voltage Variation vs. Temperature**



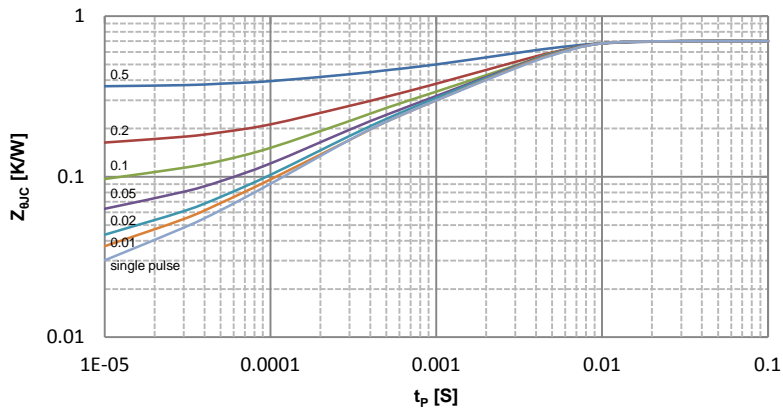
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**

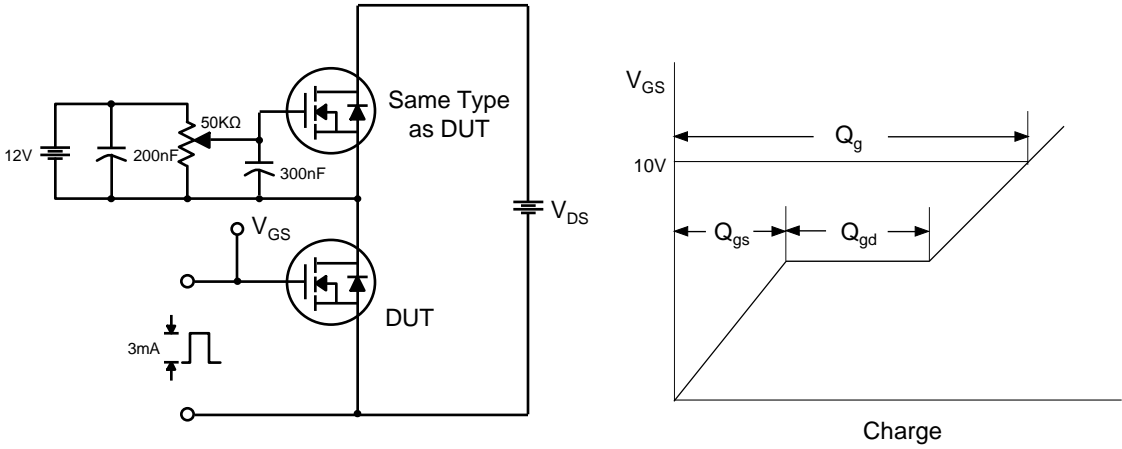


**Figure 10. Maximum Drain Current vs. Case Temperature**

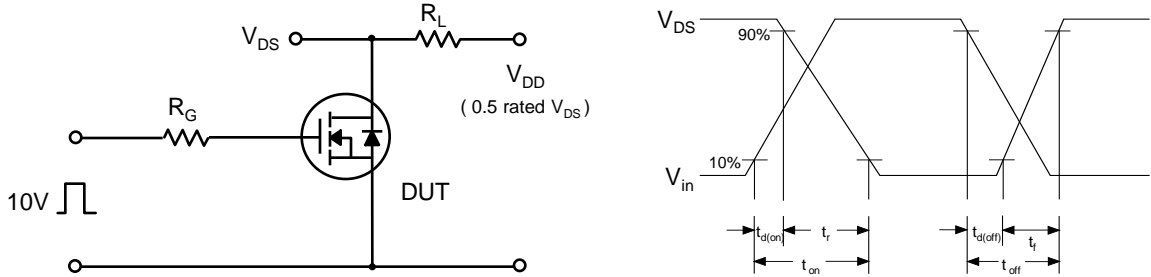


**Figure 11. Transient Thermal Response Curve**

**Fig 12. Gate Charge Test Circuit & Waveform**



**Fig 13. Resistive Switching Test Circuit & Waveforms**



**Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms**

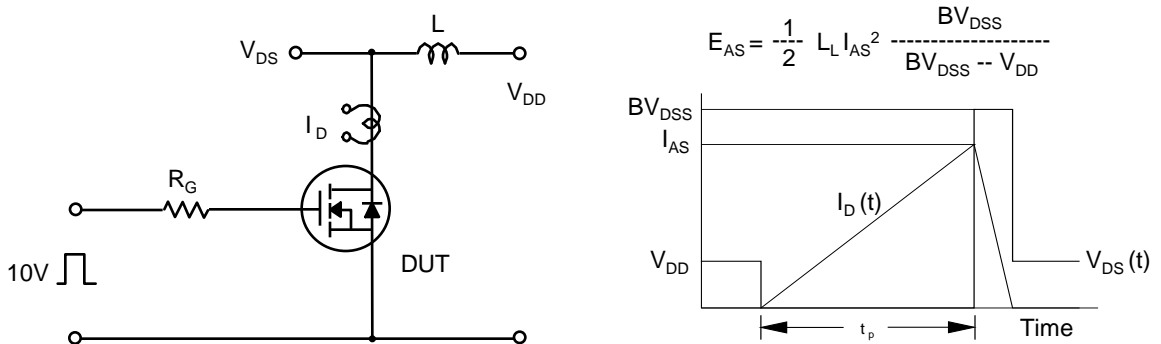
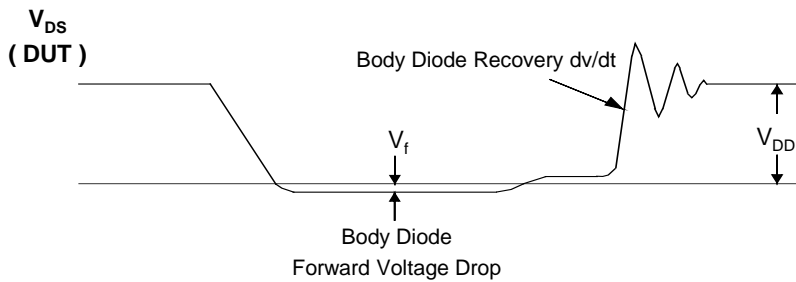
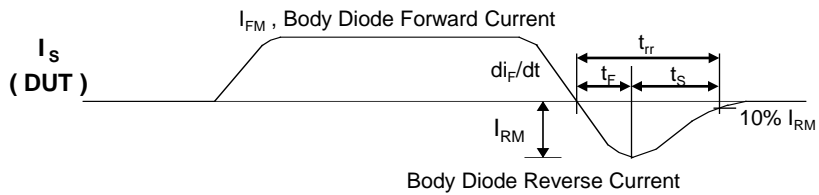
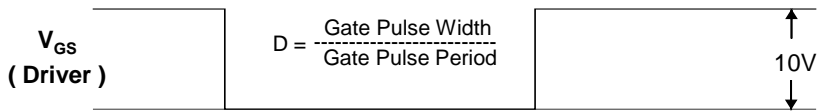
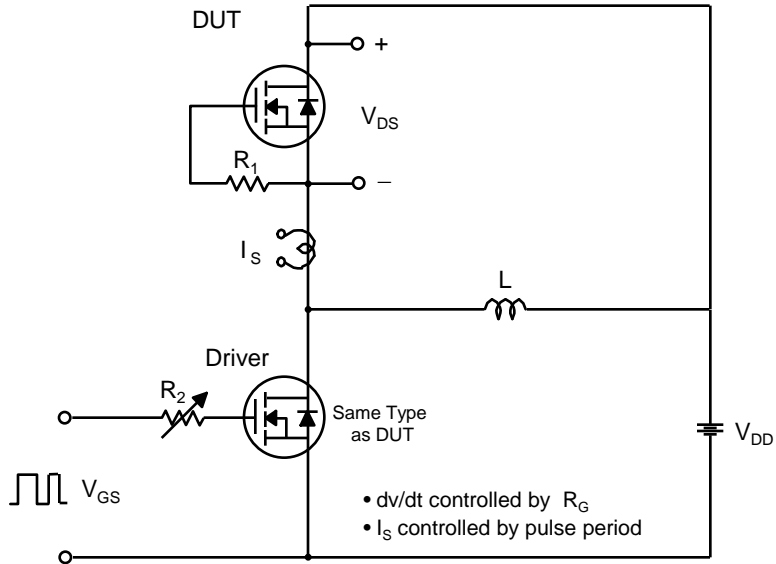
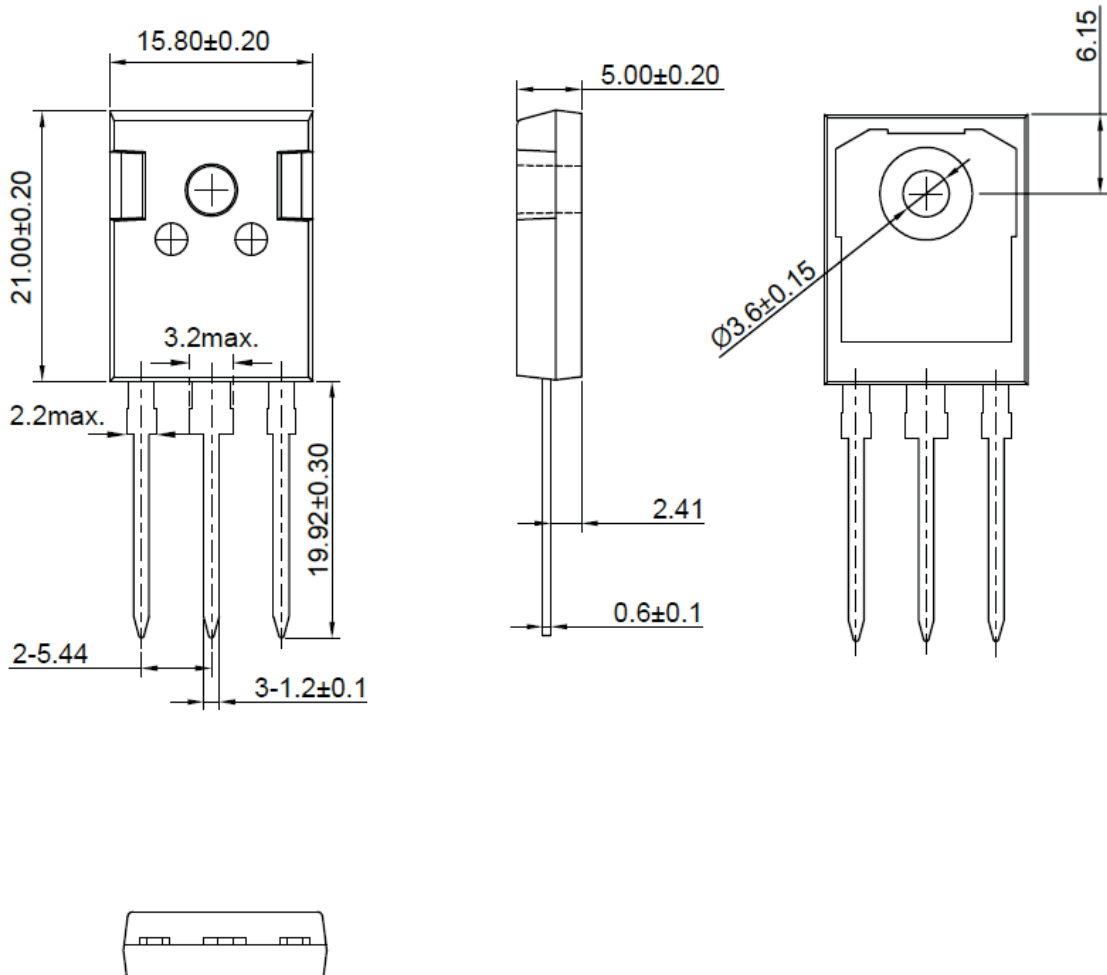


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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