

## Product Summary

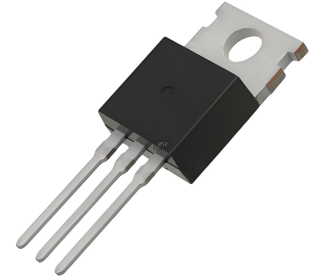
$V_{DS}$ (V)	$R_{DS(on),max}$ (mΩ)	$I_D$ (A)
200	16 @ $V_{GS} = 10V$	81 <sup>(1)</sup>

## Features

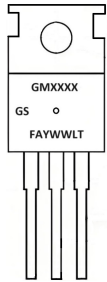
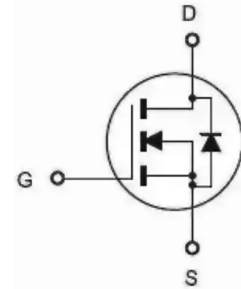
- Low  $R_{DS(on)}$  SGT technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

## Application

- DC/DC conversion
- Power switch
- Synchronous Rectification in SMPS



## Equivalent circuit



**TO-220**

NOTE:  
 LOGO - GS  
 GMXXXX- Part number code  
 F - Fab location code  
 A - Assembly location code  
 Y - Year code  
 WW - Week code  
 L&T - Assembly lot code

## Absolute maximum rating@25°C

Parameter	Symbol	Limit	Unit
Drain-source voltage	$V_{DS}$	200	V
Gate-source voltage	$V_{GS}$	±20	
Continuous drain current	$I_D$	$T_C=25^\circ C$ <sup>(1)</sup>	81
		$T_C=100^\circ C$	58
Pulsed drain current <sup>(2)</sup>	$I_{D,pulse}$	326	A
Avalanche energy, single pulse <sup>(3)</sup>	$E_{AS}$	922	mJ
Power dissipation	$P_D$	$T_C=25^\circ C$	288
		$T_A=25^\circ C$ <sup>(4)</sup>	144
Operating junction and storage temperature range	$T_J, T_{stg}$	-55 to 150	°C

## Thermal Characteristic

Parameter	Symbol	Max.	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	0.52	°C/W
Thermal resistance, junction-to-ambient <sup>(4)</sup>	$R_{\theta JA}$	33	

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
<b>Static parameter</b>						
Drain to source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA	200			V
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.5	3.4	4.5	V
Gate-body leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V			1	μA
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A		13.6	16	mΩ
Forward transconductance <sup>(5)</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 50 A		38		S
Gate resistance	R <sub>g</sub>	f = 1 MHz		2.5		Ω
<b>Dynamic <sup>(5)</sup></b>						
Total gate charge V <sub>GS</sub> = 10 V	Q <sub>g</sub>	V <sub>DS</sub> = 100 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V		31		nC
Gate-source charge	Q <sub>gs</sub>			9.8		
Gate-drain charge	Q <sub>gd</sub>			7.7		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DS</sub> = 100 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 3 Ω		14		ns
Rise time	t <sub>r</sub>			16		
Turn-off delay time	t <sub>d(off)</sub>			28		
Fall time	t <sub>f</sub>			12		
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, f = 1 MHz		2050		pF
Output capacitance	C <sub>oss</sub>			297		
Reverse transfer capacitance	C <sub>rss</sub>			11		
<b>Reverse Diode Characteristics <sup>(5)</sup></b>						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>F</sub> = 2 A		0.7	1.2	V
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs		120		ns
Reverse recovery charge	Q <sub>rr</sub>				524	

## Notes

- (1) Package limited.
- (2) Pulse width limited by maximum junction temperature.
- (3) V<sub>DS</sub> = 100 V, V<sub>GS</sub> = 10 V, L = 1.0 mH.
- (4) Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
- (5) Guaranteed by design, not subject to production testing.



### Typical Performance Characteristics

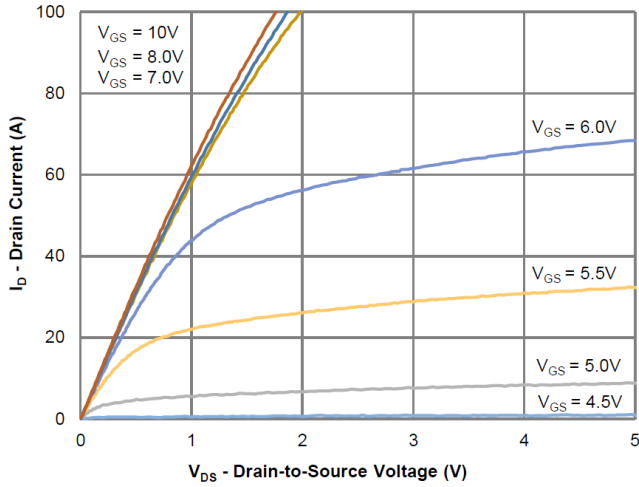


Figure 1: Output Characteristics

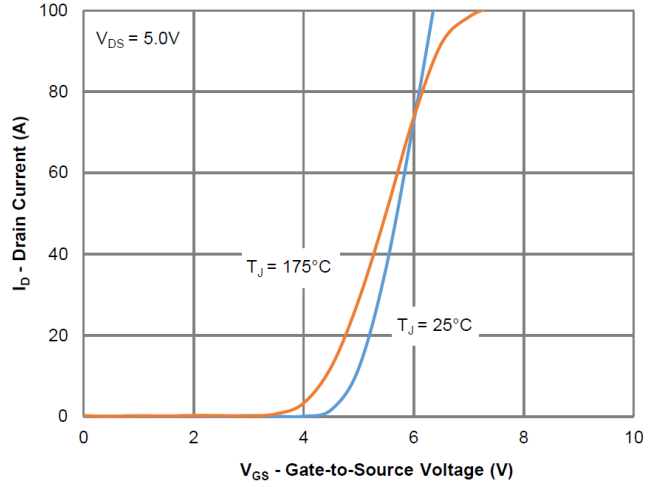


Figure 2: Transfer Characteristics

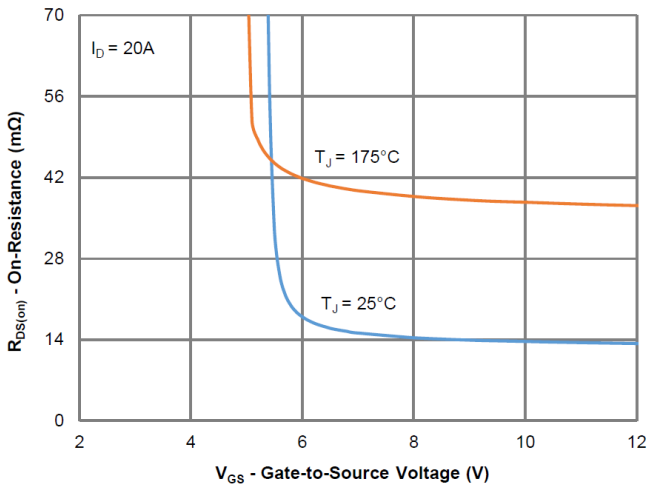


Figure 3: On-Resistance vs. Gate-Source Voltage

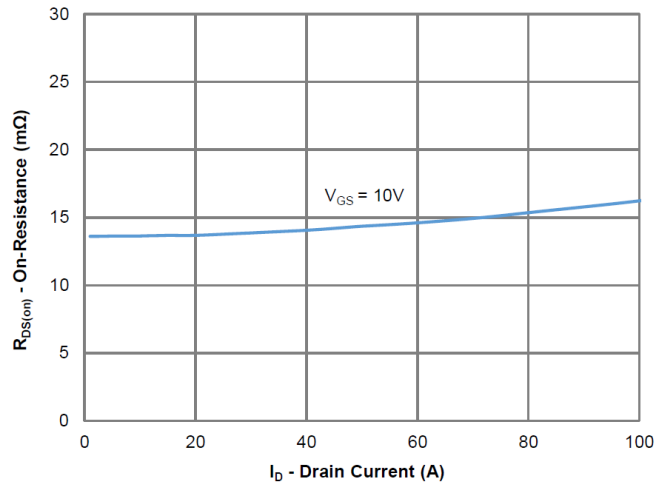


Figure 4: On-Resistance vs. Gate-Source Voltage

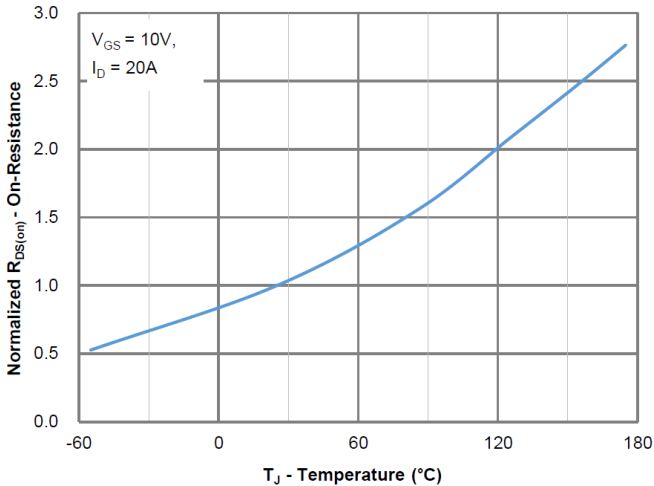


Figure 5: On-Resistance vs. Junction Temperature

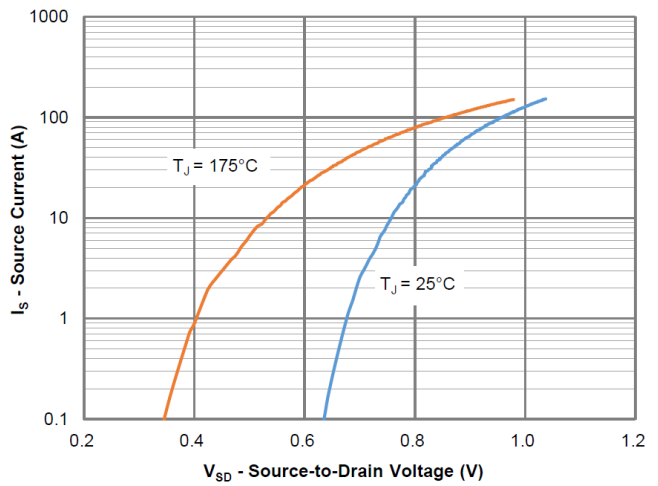


Figure 6: Source-Drain Diode Forward Voltage



### Typical Performance Characteristics

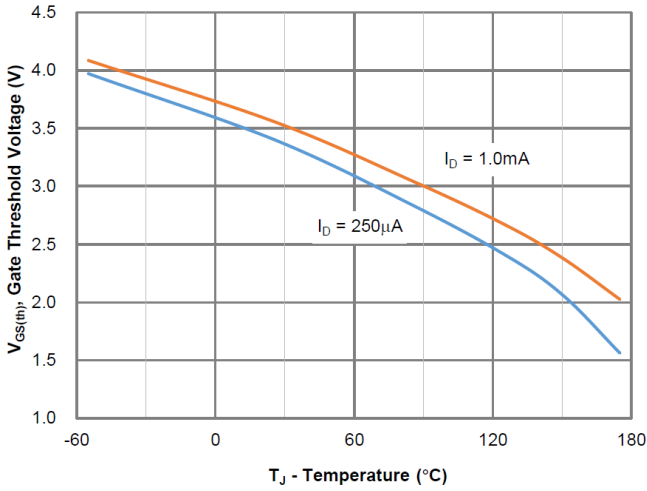


Figure 7: Gate Threshold Variation vs. Junction Temperature

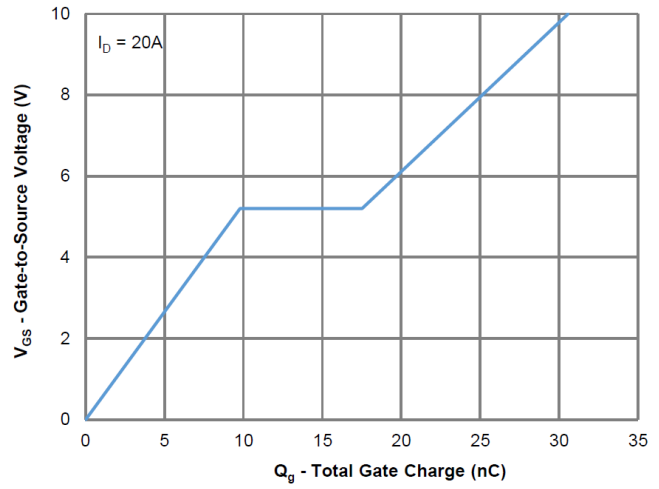


Figure 8: Gate Charge Characteristics

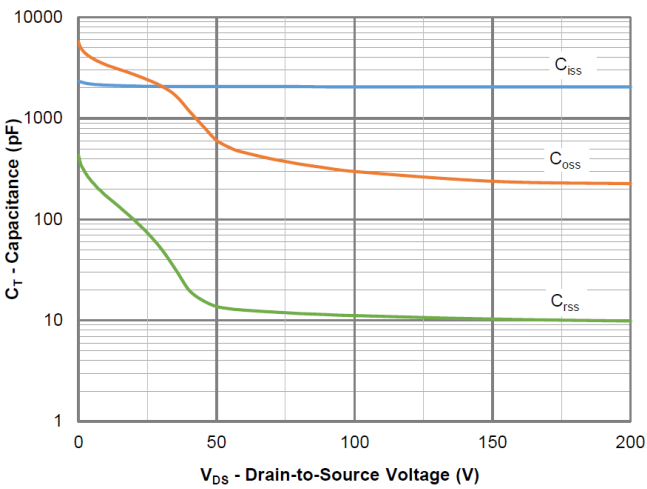


Figure 9: Capacitance Characteristics

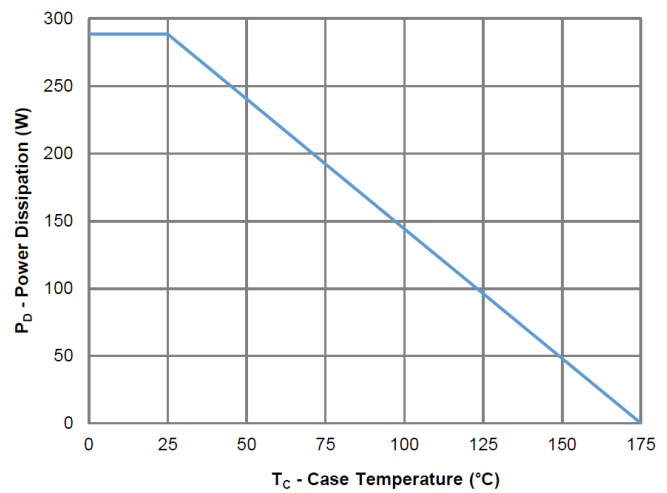


Figure 10: Power Derating

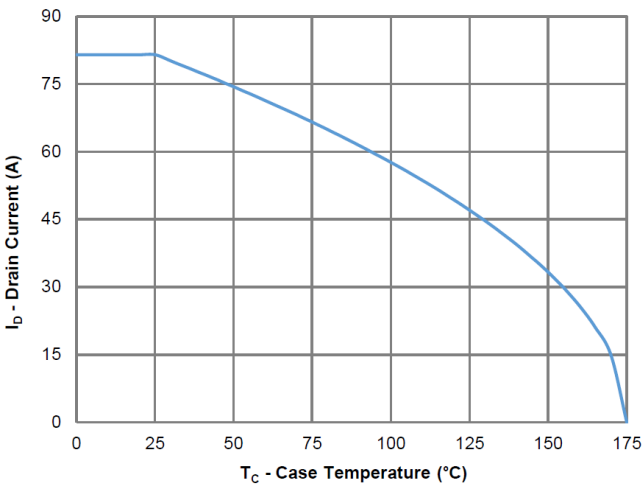


Figure 11: Current Derating

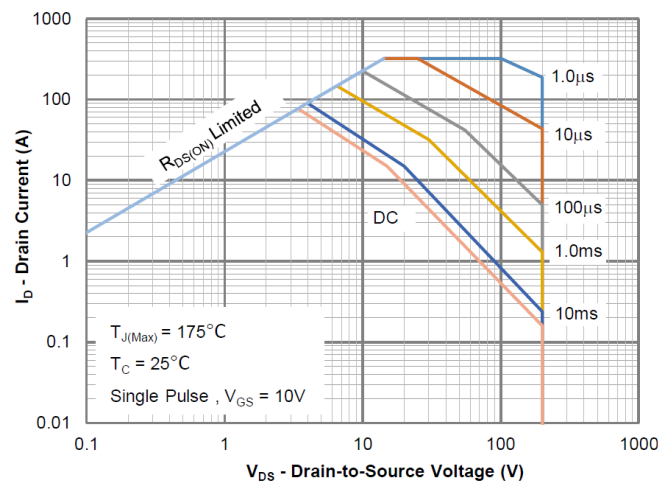


Figure 12: Safe Operating Area



Typical Performance Characteristics

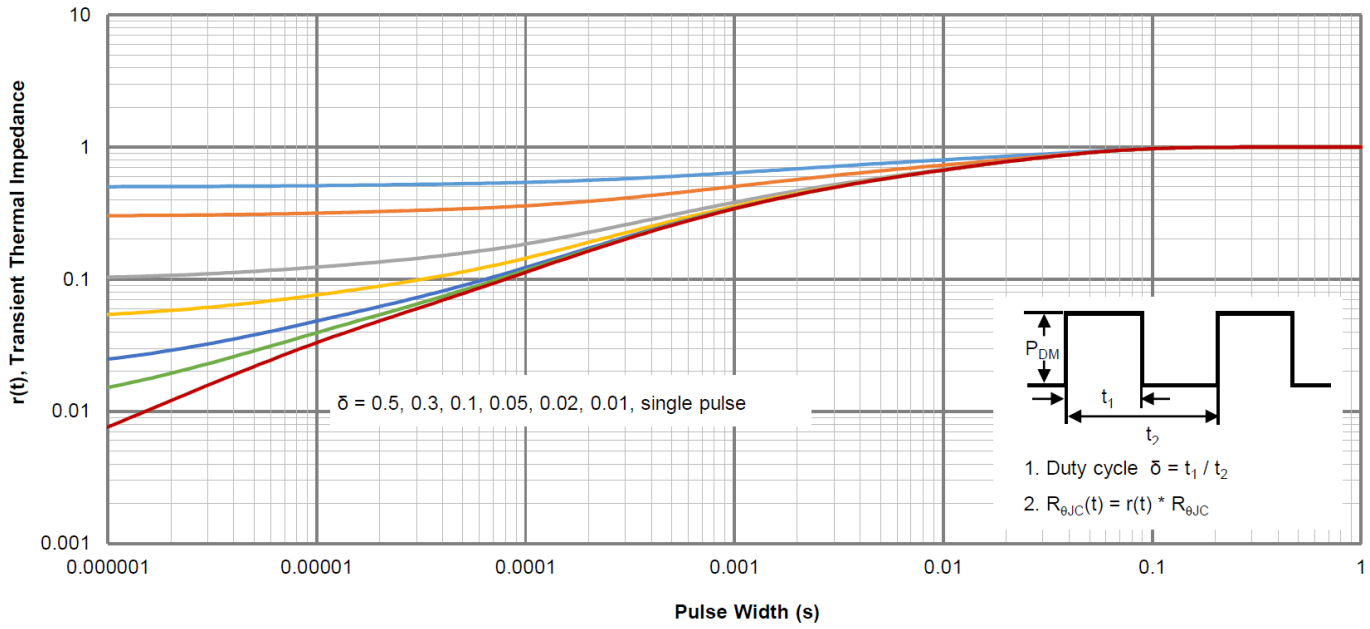
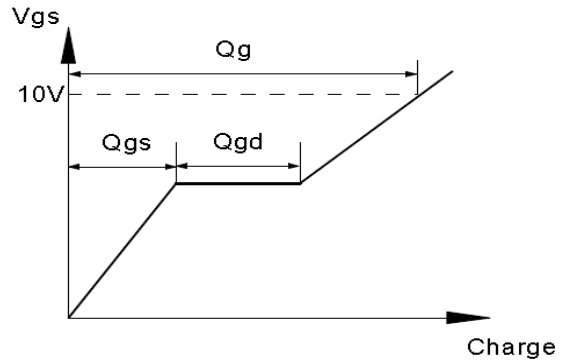
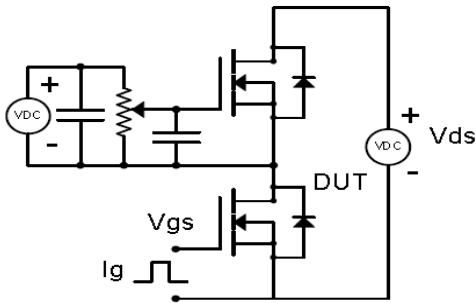


Figure 13: Normalized Maximum Transient Thermal Impedance

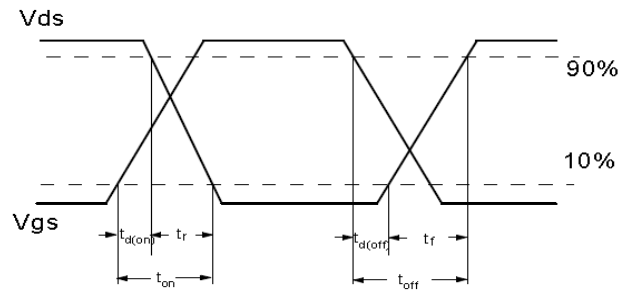
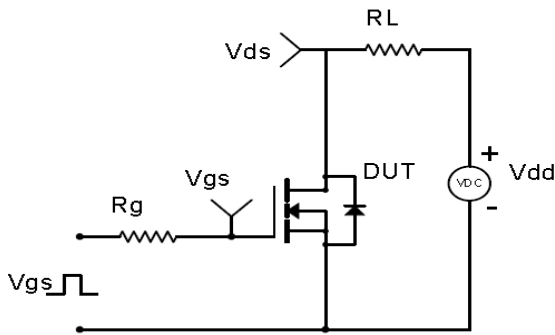


Test Circuit & Waveform

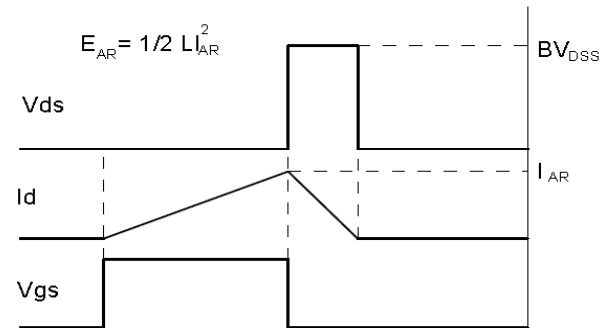
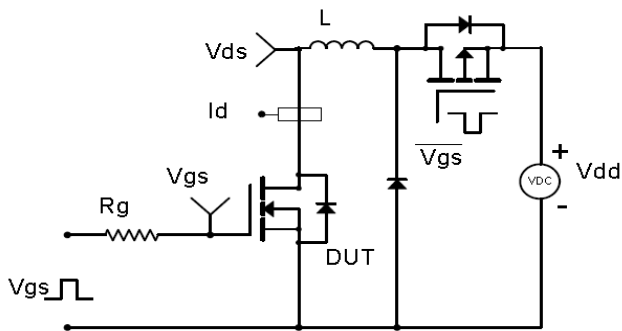
Gate Charge Test Circuit & Waveform



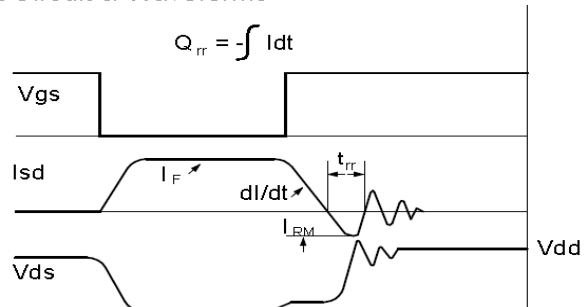
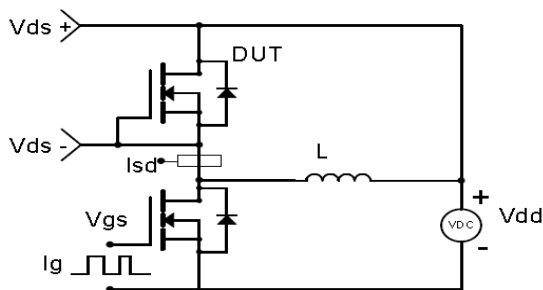
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

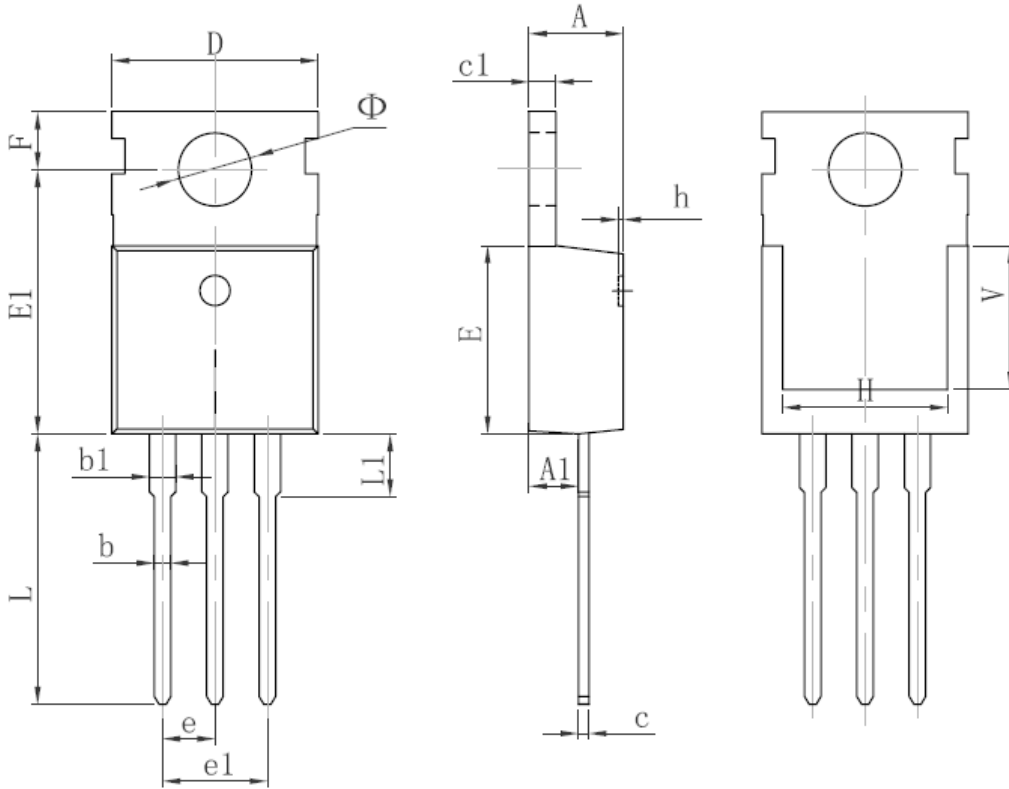


Diode Recovery Test Circuit & Waveforms





Outline Drawing TO-220



Symbol	Dimensions In Millimeters		
	Min.	NOM.	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	-	13.05
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		
phi	3.40	-	3.80

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