

FCH072N60F

N-Channel SuperFET® II FRFET® MOSFET

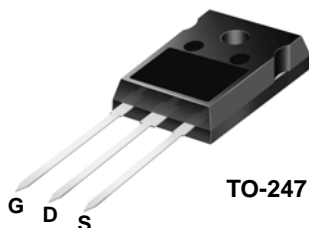
600 V, 52 A, 72 mΩ

Features

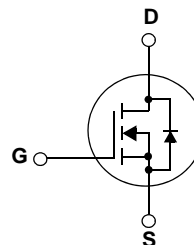
- $R_{DS(on)} = 65 \text{ m}\Omega$ (Typ)
- Ultra Low Gate Charge (Typ. $Q_g = 165 \text{ nC}$)
- Low Effective Output Capacitance
- 100% Avalanche Tested
- RoHS Compliant

Description

SuperFET®II MOSFET is Fairchild Semiconductor®'s first generation of high voltage super-junction (SJ) MOSFET family that is utilizing charge balance technology for outstanding low on-resistance and lower gate charge performance. This advanced technology is tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher avalanche energy. Consequently, SuperFETII MOSFET is suitable for various AC/DC power conversion for system miniaturization and higher efficiency.



TO-247



MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Parameter	Ratings	Unit
V_{DSS}	Drain to Source Voltage		600	V
V_{GSS}	Gate to Source Voltage	-DC	± 20	V
		-AC	30	
I_D	Drain Current	-Continuous ($T_C = 25^\circ\text{C}$)	52	A
		-Continuous ($T_C = 100^\circ\text{C}$)	33	
I_{DM}	Drain Current	- Pulsed (Note 1)	156	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	1128	mJ
I_{AR}	Avalanche Current		9.5	A
E_{AR}	Repetitive Avalanche Energy		4.8	mJ
dv/dt	MOSFET dv/dt		100	V/ns
	Peak Diode Recovery dv/dt	(Note 3)	50	V/ns
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	481	W
		- Derate above 25°C	3.85	
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	$^\circ\text{C}$

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case		0.26	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		40	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FCH072N60F	FCH072N60F	TO-247	-	-	30

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 10\text{mA}, V_{GS} = 0\text{V}, T_C = 25^\circ\text{C}$	600	-	-	V
		$I_D = 10\text{mA}, V_{GS} = 0\text{V}, T_C = 150^\circ\text{C}$	650	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 10\text{mA}, \text{Referenced to } 25^\circ\text{C}$	-	0.67	-	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 480\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
		$V_{DS} = 480\text{V}, V_{GS} = 0\text{V}, T_C = 125^\circ\text{C}$	-	-	10	μA
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	3	-	5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 26\text{A}$	-	65	72	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = 20\text{V}, I_D = 26\text{A}$	-	42	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 100\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$	-	6510	8660	pF
C_{oss}	Output Capacitance		-	205	275	pF
C_{riss}	Reverse Transfer Capacitance		-	1.5	2.5	pF
C_{oss}	Output Capacitance	$V_{DS} = 380\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	-	110	-	pF
$C_{oss,eff.}$	Effective Output Capacitance	$V_{DS} = 0\text{V to } 480\text{V}, V_{GS} = 0\text{V}$	-	441	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	$V_{DS} = 380\text{V}, I_D = 26\text{A},$ $V_{GS} = 10\text{V}$ (Note 4)	-	165	215	nC
Q_{gs}	Gate to Source Gate Charge		-	36	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	66	-	nC
ESR	Equivalent Series Resistance(G-S)	Drain Open	-	0.78	-	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 380\text{V}, I_D = 26\text{A}$ $R_G = 4.7\Omega$ (Note 4)	-	43	96	ns
t_r	Turn-On Rise Time		-	38	86	ns
$t_{d(off)}$	Turn-Off Delay Time		-	140	290	ns
t_f	Turn-Off Fall Time		-	25	60	ns

Drain-Source Diode Characteristics

I_S	Maximum Continuous Drain to Source Diode Forward Current	-	-	52	A	
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current	-	-	156	A	
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_{SD} = 26\text{A}$	-	-	1.2	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{V}, I_{SD} = 26\text{A}$	-	165	-	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt = 100\text{A}/\mu\text{s}$	-	1.15	-	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 9.5\text{A}, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 26\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq 380\text{V}$, Starting $T_J = 25^\circ\text{C}$
4. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

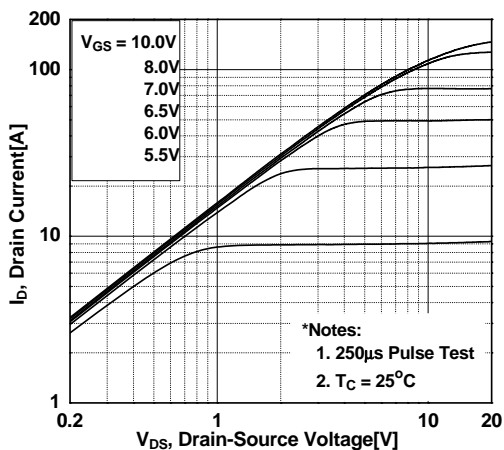


Figure 2. Transfer Characteristics

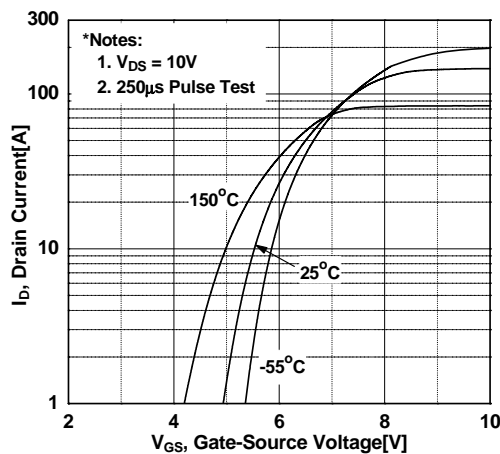


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

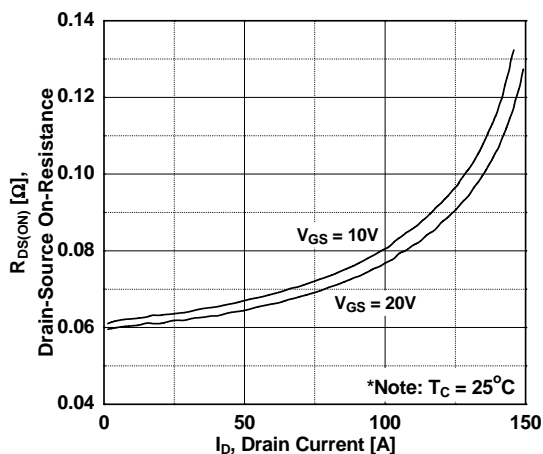


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

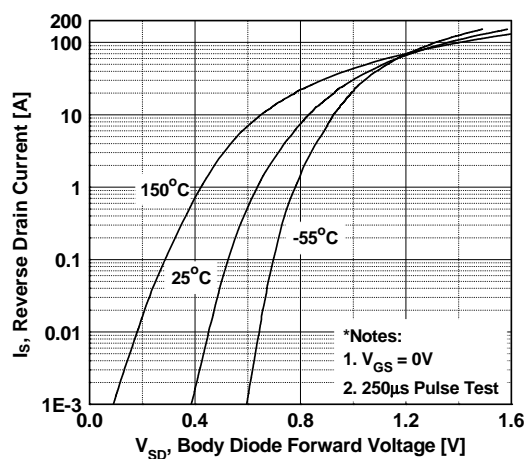


Figure 5. Capacitance Characteristics

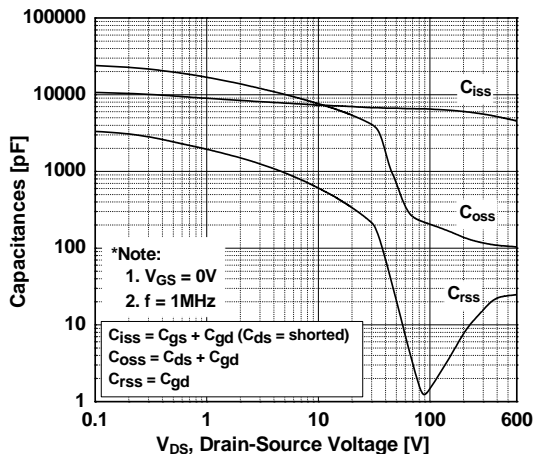
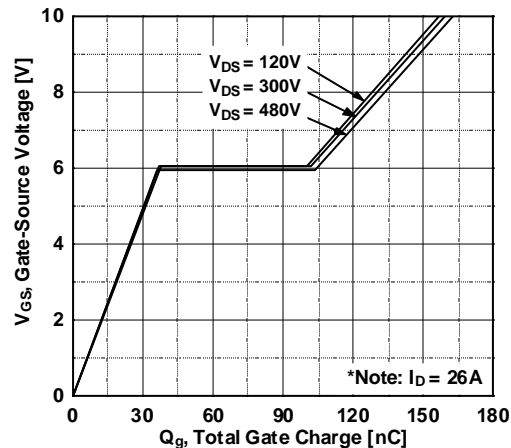


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

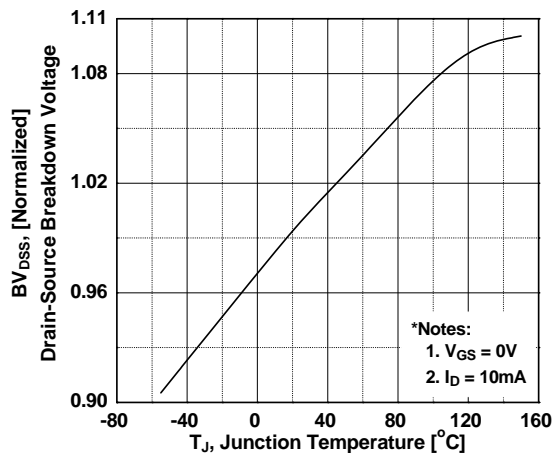


Figure 8. On-Resistance Variation vs. Temperature

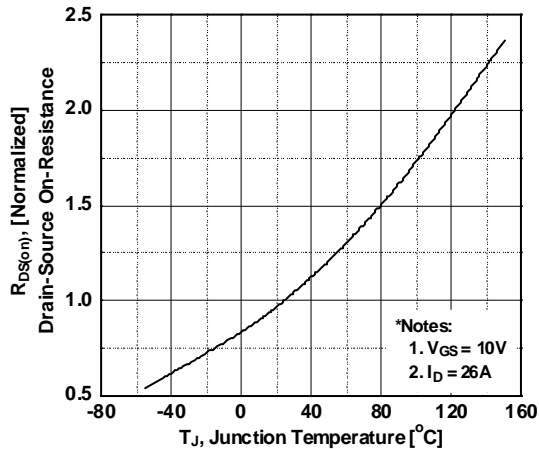


Figure 9. Maximum Safe Operating Area

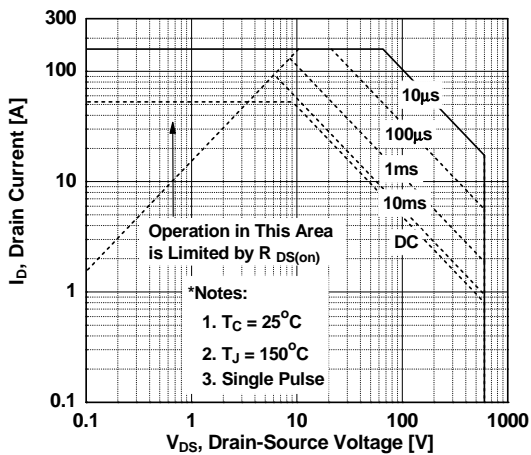


Figure 10. Maximum Drain Current vs. Case Temperature

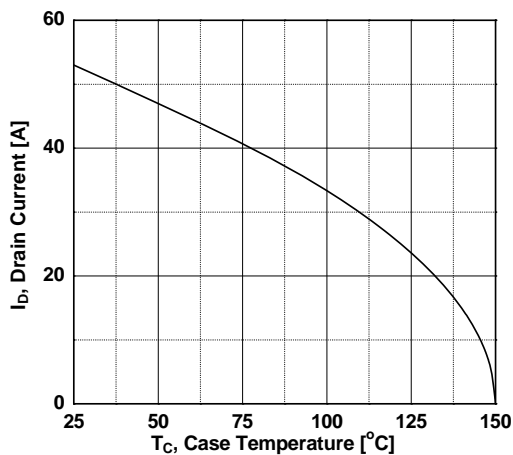
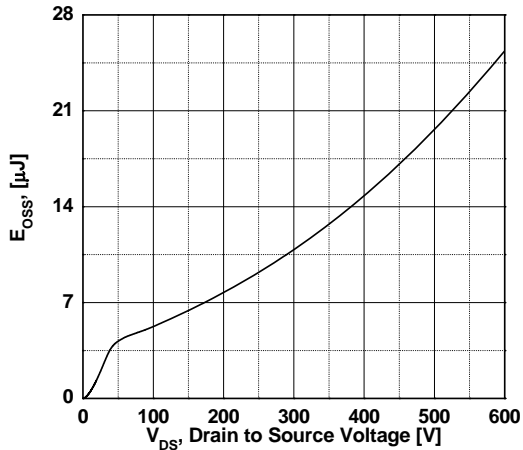
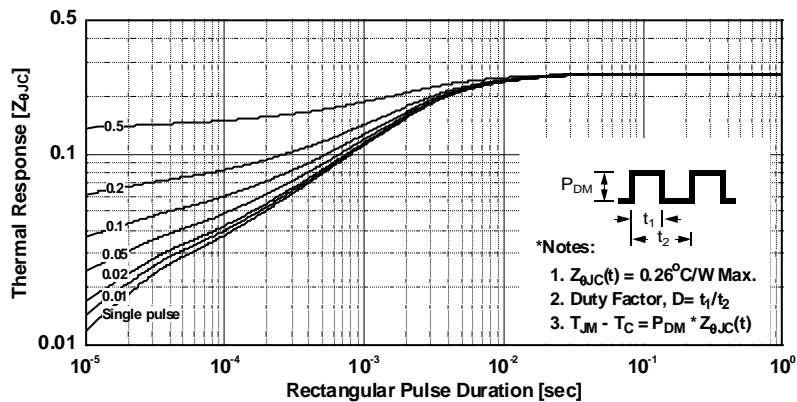


Figure 11. Eoss vs. Drain to Source Voltage

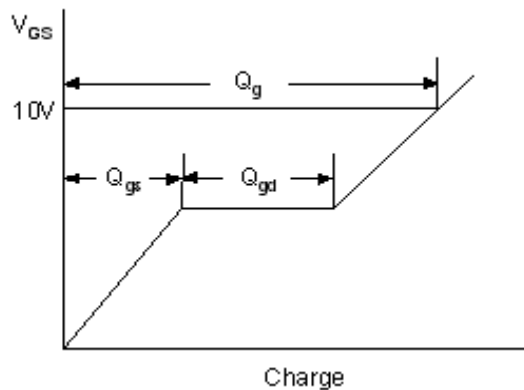
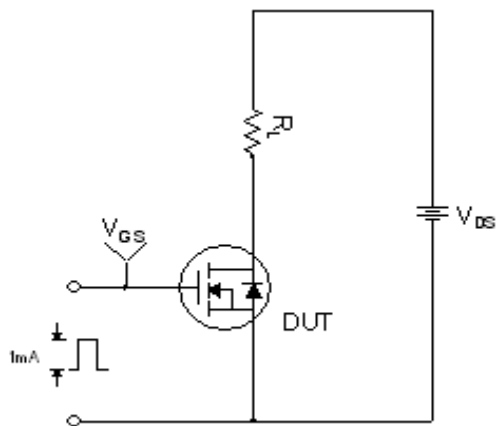


Typical Performance Characteristics (Continued)

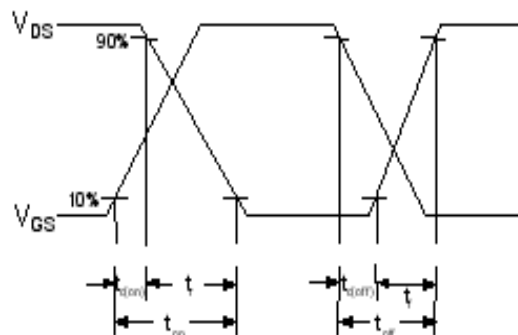
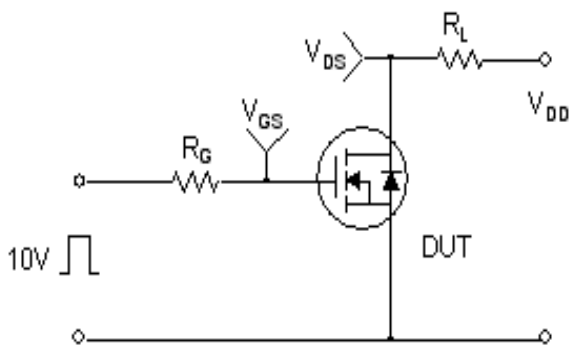
Figure 12. Transient Thermal Response Curve



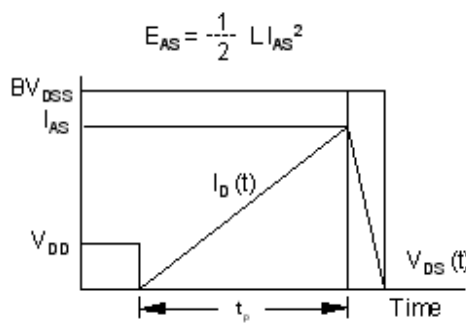
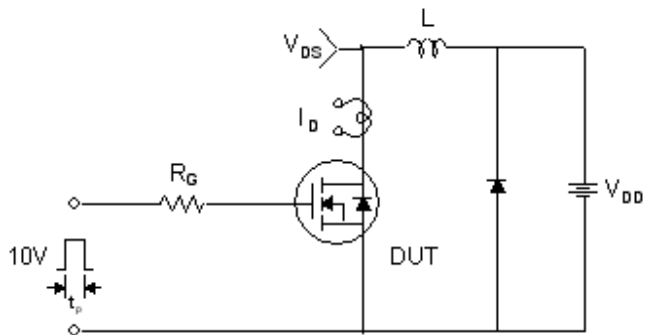
Gate Charge Test Circuit & Waveform



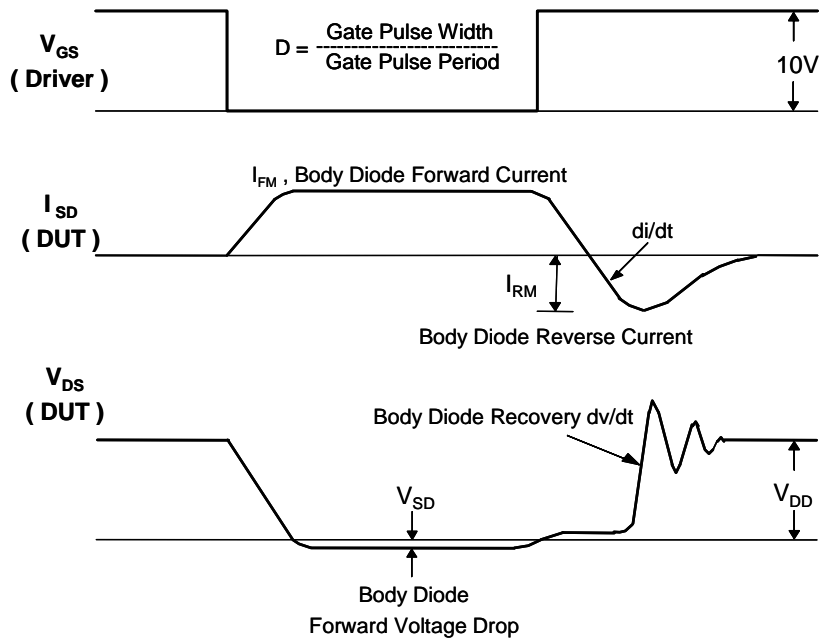
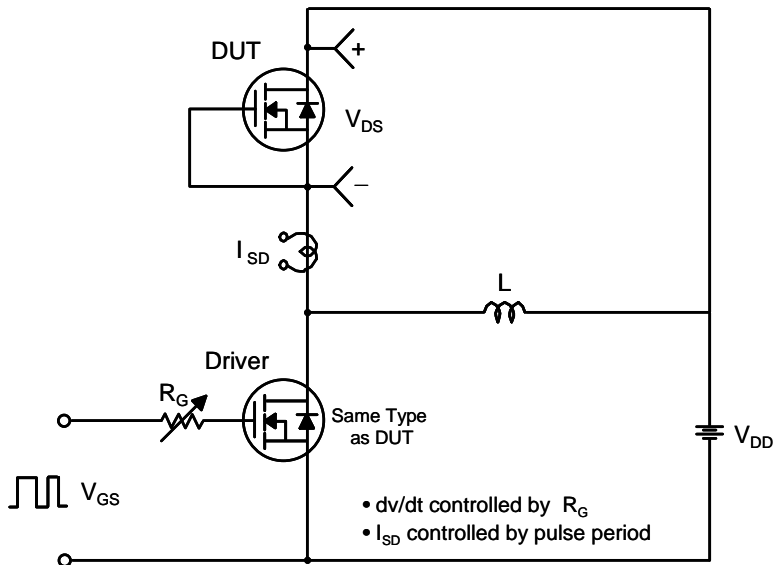
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

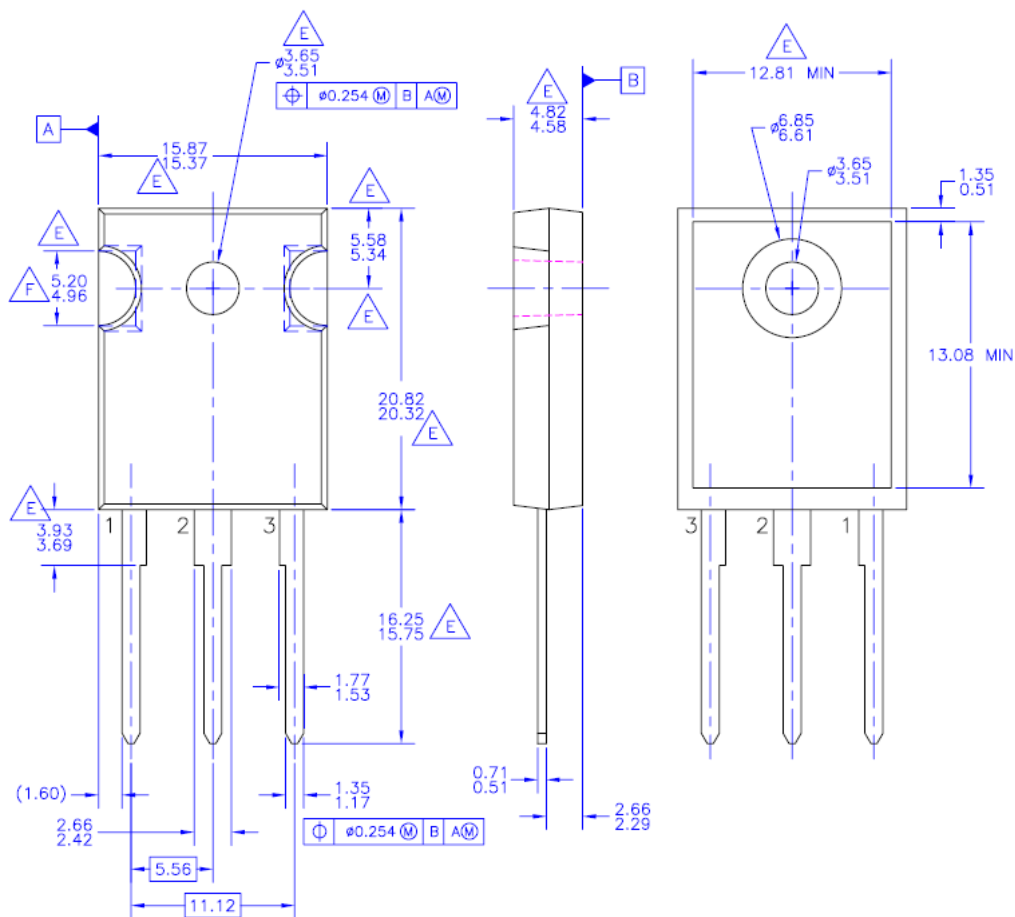


Peak Diode Recovery dv/dt Test Circuit & Waveforms



Mechanical Dimensions

TO-247







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 - G. DRAWING FILENAME: MKT-TO247A03_REV02

Dimensions in Millimeters



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