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July 2014

## FCH130N60

### N-Channel SuperFET® II MOSFET

600 V, 28 A, 130 mΩ

#### Features

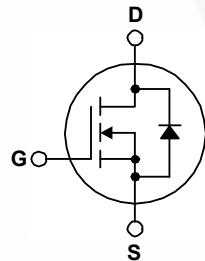
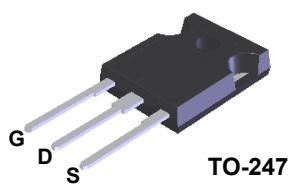
- 650 V @  $T_J = 150^\circ\text{C}$
- Typ.  $R_{DS(on)} = 112 \text{ m}\Omega$
- Ultra Low Gate Charge (Typ.  $Q_g = 54 \text{ nC}$ )
- Low Effective Output Capacitance (Typ.  $C_{oss(\text{eff.})} = 240 \text{ pF}$ )
- 100% Avalanche Tested
- RoHS Compliant

#### Applications

- Telecom / Server Power Supplies
- Industrial Power Supplies
- AC-DC Power Supply

#### Description

SuperFET® II MOSFET is Fairchild Semiconductor's brand-new 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, SuperFET II MOSFET is suitable for various AC/DC power conversion for system miniaturization and higher efficiency.



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

Symbol	Parameter		FCH130N60	Unit
$V_{DSS}$	Drain to Source Voltage		600	V
$V_{GSS}$	Gate to Source Voltage	- DC	$\pm 20$	V
		- AC ( $f > 1 \text{ Hz}$ )	$\pm 30$	
$I_D$	Drain Current	- Continuous ( $T_C = 25^\circ\text{C}$ )	28	A
		- Continuous ( $T_C = 100^\circ\text{C}$ )	18	
$I_{DM}$	Drain Current	- Pulsed	(Note 1)	A
$E_{AS}$	Single Pulsed Avalanche Energy		(Note 2)	mJ
$I_{AR}$	Avalanche Current		(Note 1)	A
$E_{AR}$	Repetitive Avalanche Energy		(Note 1)	mJ
$dv/dt$	MOSFET $dv/dt$		100	V/ns
	Peak Diode Recovery $dv/dt$		(Note 3)	
$P_D$	Power Dissipation	( $T_C = 25^\circ\text{C}$ )	278	W
		- Derate Above $25^\circ\text{C}$	2.2	
$T_J, T_{STG}$	Operating and Storage Temperature Range		-55 to +150	°C
$T_L$	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		300	°C

#### Thermal Characteristics

Symbol	Parameter	FCH130N60	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.45	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	40	

## Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FCH130N60	FCH130N60	TO-247	Tube	N/A	N/A	30 units

## 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

$\text{BV}_{\text{DSS}}$	Drain to Source Breakdown Voltage	$V_{\text{GS}} = 0 \text{ V}$ , $I_D = 10 \text{ mA}$ , $T_J = 25^\circ\text{C}$	600	-	-	V
		$V_{\text{GS}} = 0 \text{ V}$ , $I_D = 10 \text{ mA}$ , $T_J = 150^\circ\text{C}$	650	-	-	
$\Delta \text{BV}_{\text{DSS}} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 10 \text{ mA}$ , Referenced to $25^\circ\text{C}$	-	0.67	-	$\text{V}^\circ\text{C}$
$I_{\text{DSS}}$	Zero Gate Voltage Drain Current	$V_{\text{DS}} = 600 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$	-	-	1	$\mu\text{A}$
		$V_{\text{DS}} = 480 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$ , $T_C = 125^\circ\text{C}$	-	2.5	-	
$I_{\text{GSS}}$	Gate to Body Leakage Current	$V_{\text{GS}} = \pm 20 \text{ V}$ , $V_{\text{DS}} = 0 \text{ V}$	-	-	$\pm 100$	nA

### On Characteristics

$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	$V_{\text{GS}} = V_{\text{DS}}$ , $I_D = 250 \mu\text{A}$	2.5	-	3.5	V
$R_{\text{DS}(\text{on})}$	Static Drain to Source On Resistance	$V_{\text{GS}} = 10 \text{ V}$ , $I_D = 14 \text{ A}$	-	112	130	$\text{m}\Omega$
$g_{\text{FS}}$	Forward Transconductance	$V_{\text{DS}} = 20 \text{ V}$ , $I_D = 14 \text{ A}$	-	26	-	S

### Dynamic Characteristics

$C_{\text{iss}}$	Input Capacitance	$V_{\text{DS}} = 380 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	-	2700	3590	pF
$C_{\text{oss}}$	Output Capacitance		-	65	85	pF
$C_{\text{rss}}$	Reverse Transfer Capacitance		-	2.85	-	pF
$C_{\text{oss}(\text{eff.})}$	Effective Output Capacitance	$V_{\text{DS}} = 0 \text{ V}$ to $480 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$	-	240	-	pF
$Q_{\text{g}(\text{tot})}$	Total Gate Charge at 10V	$V_{\text{DS}} = 380 \text{ V}$ , $I_D = 14 \text{ A}$ ,	-	54	70	nC
$Q_{\text{gs}}$	Gate to Source Gate Charge	$V_{\text{GS}} = 10 \text{ V}$	-	12	-	nC
$Q_{\text{gd}}$	Gate to Drain "Miller" Charge		(Note 4)	-	14	nC
ESR	Equivalent Series Resistance	$f = 1 \text{ MHz}$	-	1	-	$\Omega$

### Switching Characteristics

$t_{\text{d}(\text{on})}$	Turn-On Delay Time	$V_{\text{DD}} = 380 \text{ V}$ , $I_D = 14 \text{ A}$ ,	-	25	60	ns
$t_r$	Turn-On Rise Time		-	16	42	ns
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time		-	65	140	ns
$t_f$	Turn-Off Fall Time		-	4	18	ns

### Drain-Source Diode Characteristics

$I_S$	Maximum Continuous Drain to Source Diode Forward Current	-	-	28	A
$I_{\text{SM}}$	Maximum Pulsed Drain to Source Diode Forward Current	-	-	84	A
$V_{\text{SD}}$	Drain to Source Diode Forward Voltage	$V_{\text{GS}} = 0 \text{ V}$ , $I_{\text{SD}} = 14 \text{ A}$	-	-	$1.2 \text{ V}$
$t_{\text{rr}}$	Reverse Recovery Time	$V_{\text{GS}} = 0 \text{ V}$ , $I_{\text{SD}} = 14 \text{ A}$ ,	-	376	-
$Q_{\text{rr}}$	Reverse Recovery Charge	$dl_F/dt = 100 \text{ A}/\mu\text{s}$	-	7.6	$\mu\text{C}$

#### Notes:

1. Repetitive rating: pulse width limited by maximum junction temperature.
2.  $I_{\text{AS}} = 6 \text{ A}$ ,  $V_{\text{DD}} = 50 \text{ V}$ ,  $R_G = 25 \Omega$ , starting  $T_J = 25^\circ\text{C}$ .
3.  $I_{\text{SD}} \leq 14 \text{ A}$ ,  $di/dt \leq 200 \text{ A}/\mu\text{s}$ ,  $V_{\text{DD}} \leq \text{BV}_{\text{DSS}}$ , starting  $T_J = 25^\circ\text{C}$ .
4. Essentially independent of operating temperature typical characteristics.

## Typical Performance Characteristics

Figure 1. On-Region Characteristics

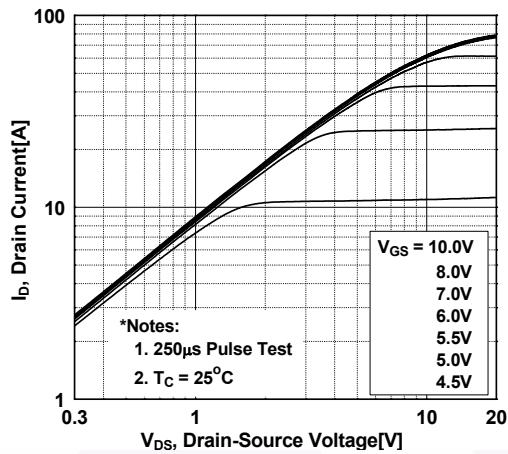


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

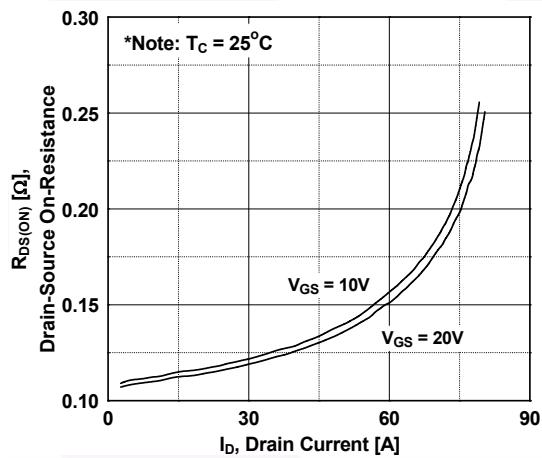


Figure 5. Capacitance Characteristics

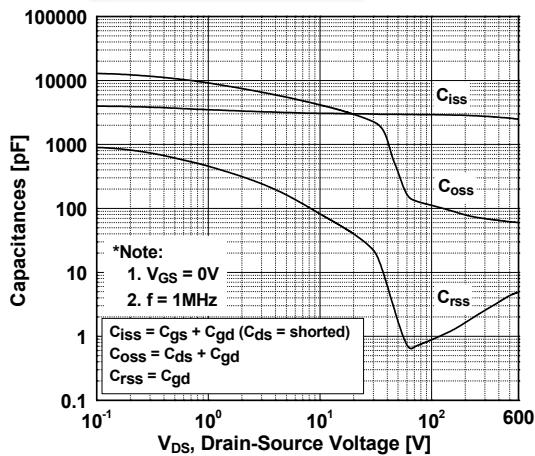


Figure 2. Transfer Characteristics

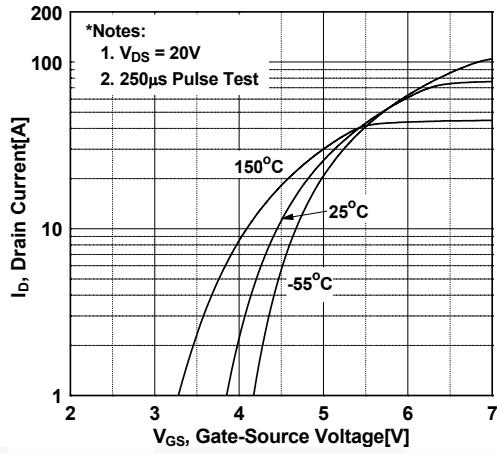


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

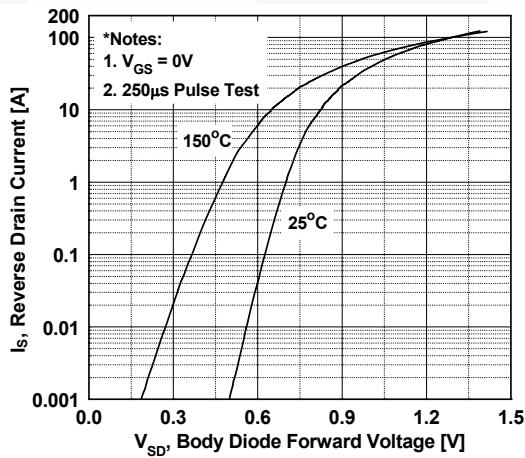
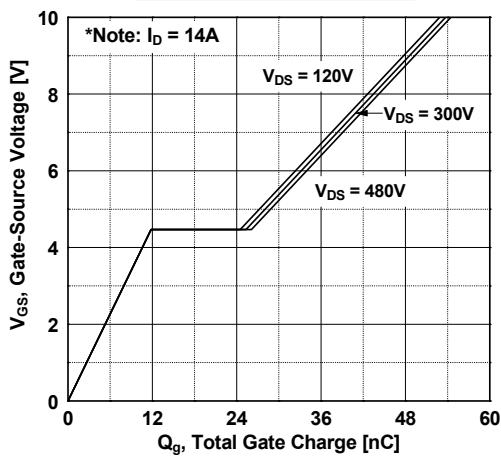
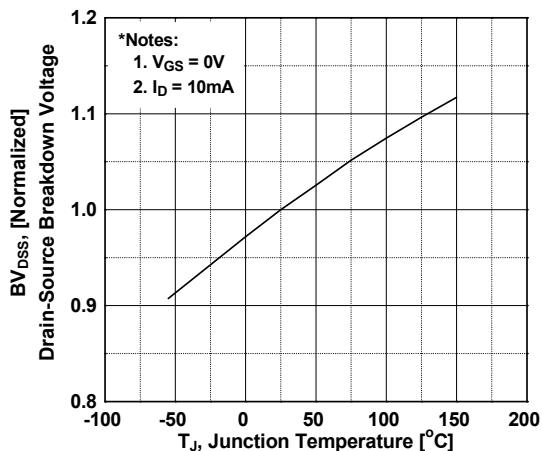


Figure 6. Gate Charge Characteristics

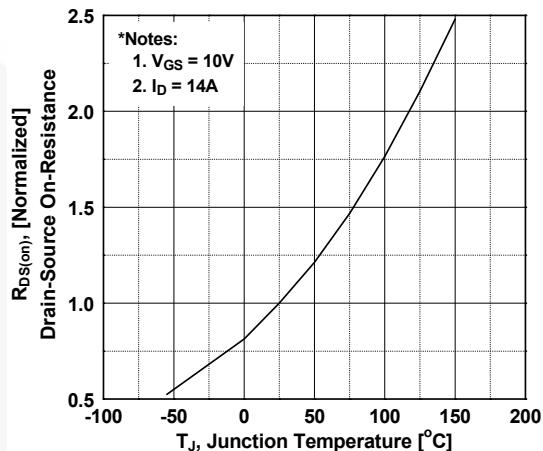


## Typical Performance Characteristics (Continued)

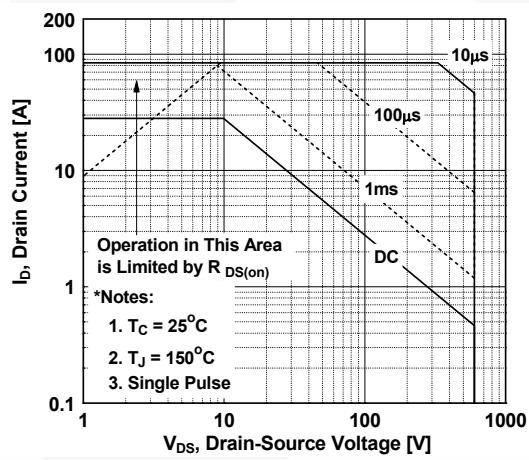
**Figure 7. Breakdown Voltage Variation vs. Temperature**



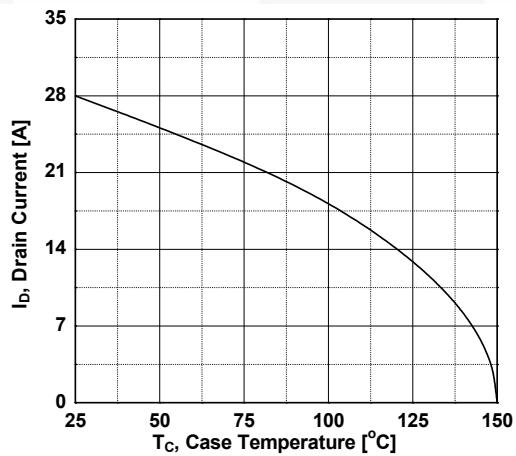
**Figure 8. On-Resistance Variation vs. Temperature**



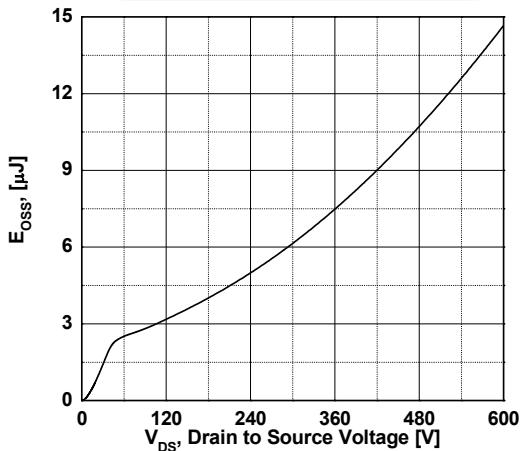
**Figure 9. Maximum Safe Operating Area**



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

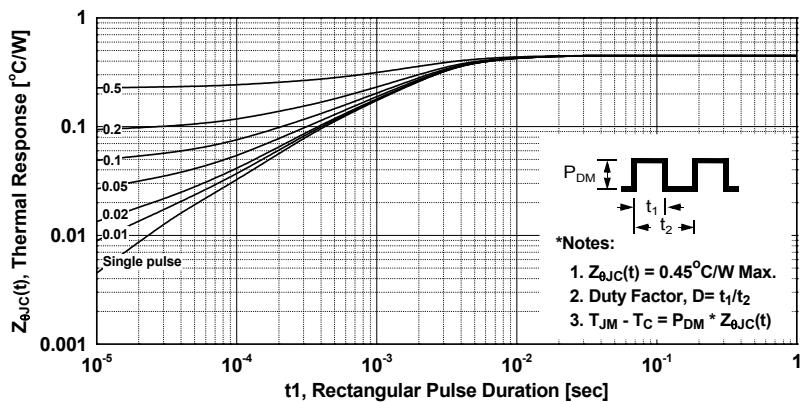


**Figure 11. Eoss vs. Drain to Source Voltage**



## Typical Performance Characteristics (Continued)

Figure 12. Transient Thermal Response Curve



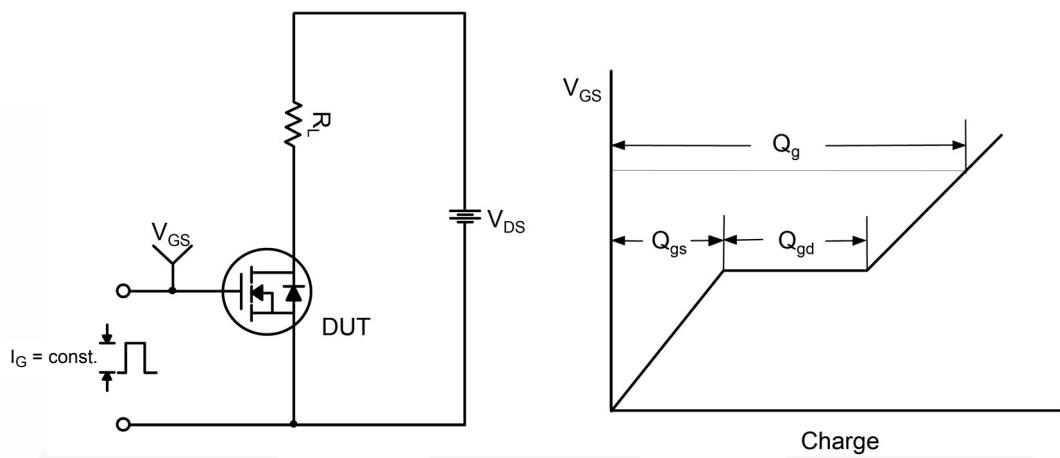


Figure 13. Gate Charge Test Circuit & Waveform

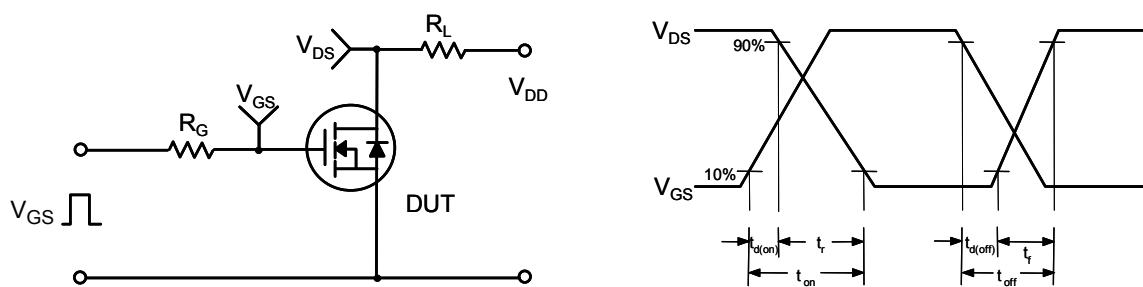


Figure 14. Resistive Switching Test Circuit & Waveforms

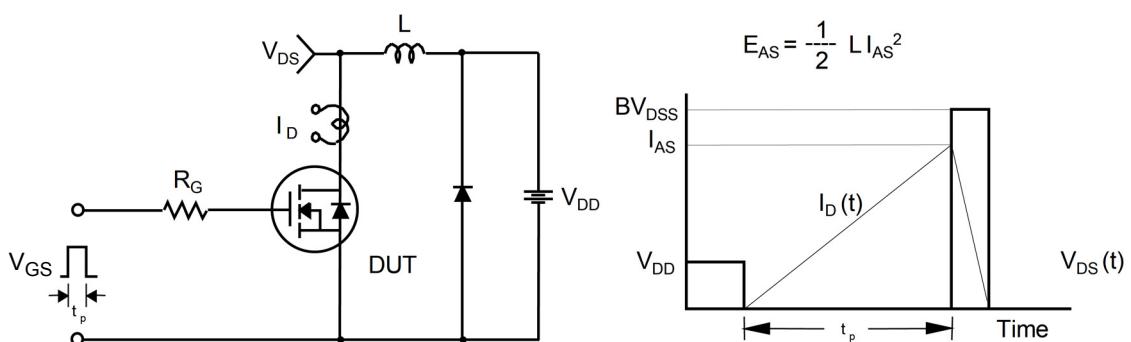


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

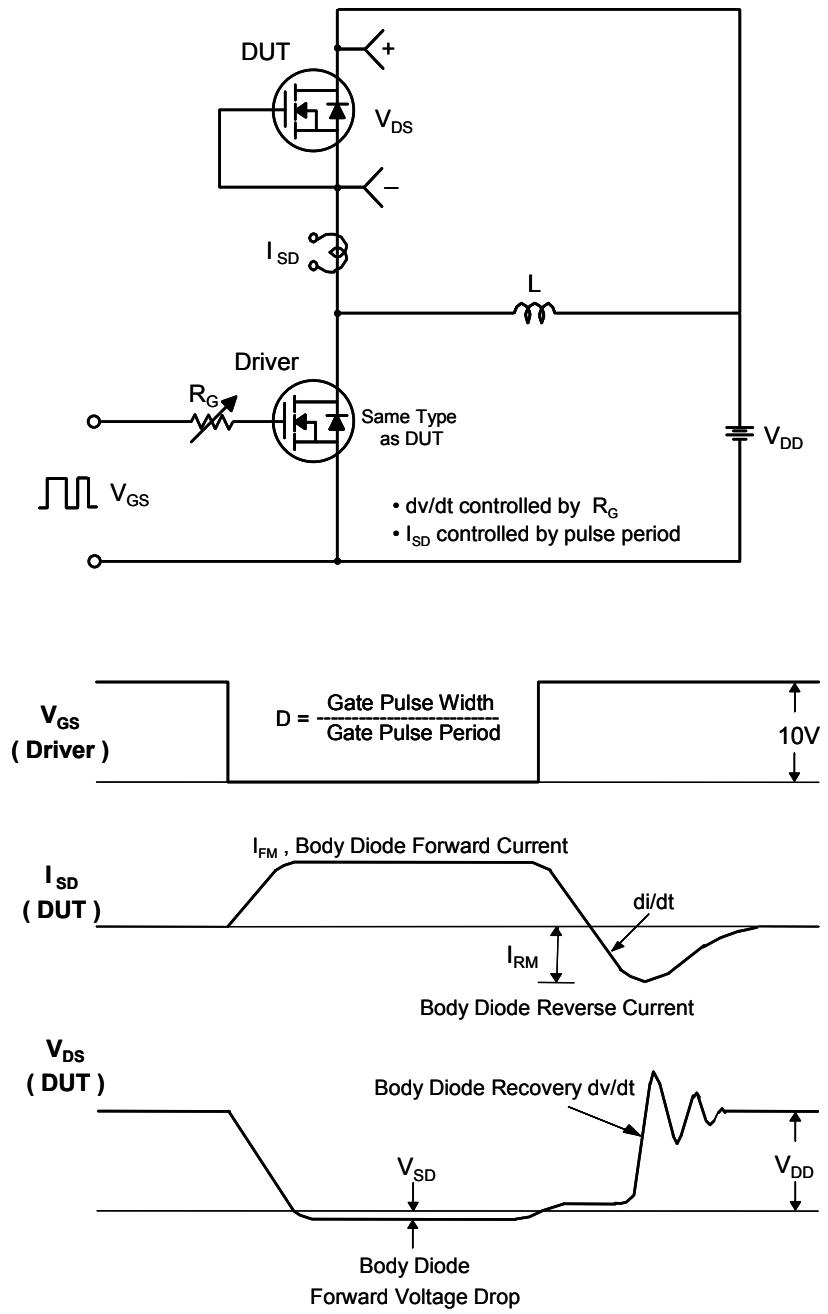
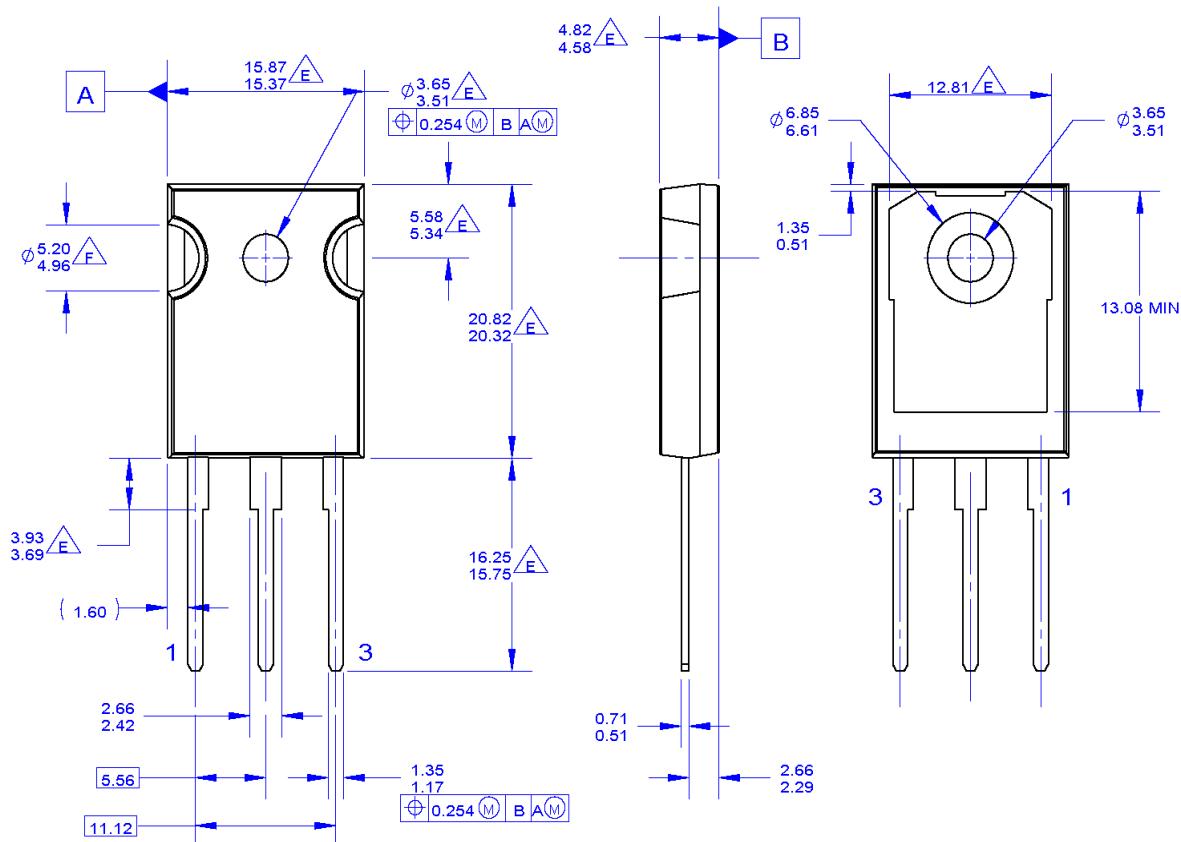


Figure 16. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms

## Mechanical Dimensions

TO-247 3L



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- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

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**Figure 17. TO-247, Molded, 3 Lead, Jedec Variation AB**

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- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибутором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибутором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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