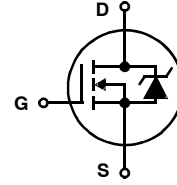


MOSFET – Power, N-Channel, Ultrafet

150 V, 75 A, 16 mΩ

HUF75852G3



Features

- Ultra Low On-Resistance
 - ◆ $r_{DS(ON)} = 0.016 \Omega$, $V_{GS} = 10 V$
- Simulation Models
 - ◆ Temperature Compensated PSPICE™ and SABER™ Electrical Models
 - ◆ Spice and SABER Thermal Impedance Models
 - ◆ www.onsemi.com
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- This Device is Pb-Free, Halogen Free/BFR Free and is RoHS Compliant

Packing

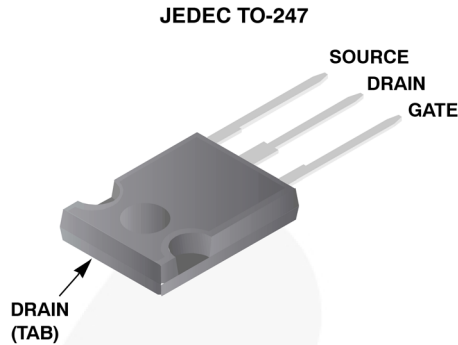
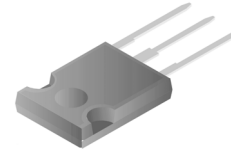
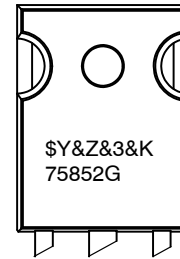


Figure 1.



TO-247-3LD
CASE 340CK

MARKING DIAGRAMS



- \$Y = onsemi Logo
- &Z = Assembly Plant Code
- &3 = Data Code (Year & Week)
- &K = Lot
- 75852G = Specific Device Code

ORDERING INFORMATION

Part Number	Package	Brand
HUF75852G3	TO-247-3LD	75852G

HUF75852G3

ABSOLUTE MAXIMUM RATINGS $T_C = 25^\circ\text{C}$ unless otherwise noted

Description	Symbol	Ratings	Units
Drain to Source Voltage (Note 1)	V_{DSS}	150	V
Drain to Gate Voltage ($R_{GS} = 20\text{ k}\Omega$) (Note 1)	V_{DGR}	150	V
Gate to Source Voltage	V_{GS}	+20	V
Drain Current – Continuous ($T_C = 25^\circ\text{C}$, $V_{GS} = 10\text{ V}$) (Figure 2) – Continuous ($T_C = 100^\circ\text{C}$, $V_{GS} = 10\text{ V}$) (Figure 2) – Pulsed Drain Current	I_D I_D I_{DM}	75 75 Figure 4	A A
Pulsed Avalanche Rating	UIS	Figures 6, 14, 15	
Power Dissipation – Derate Above 25°C	P_D	500 3.33	W W/ $^\circ\text{C}$
Operating and Storage Temperature	T_J , T_{STG}	-55 to 175	$^\circ\text{C}$
Maximum Temperature for Soldering – Leads at 0.063 in (1.6 mm) from Case for 10 s – Package Body for 10 s, See Techbrief TB334	T_L T_{pkg}	300 260	$^\circ\text{C}$ $^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. $T_J = 25^\circ\text{C}$ to 150°C .

HUF75852G3

ELECTRICAL SPECIFICATIONS $T_J = 25^\circ\text{C}$ unless otherwise noted

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
--------	-----------	-----------------	-----	-----	-----	-------

OFF STATE SPECIFICATIONS

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}$, $V_{GS} = 0 \text{ V}$ (Figure 11)	150	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 140 \text{ V}$, $V_{GS} = 0 \text{ V}$	-	-	1	μA
		$V_{DS} = 135 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_C = 150^\circ\text{C}$	-	-	250	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20 \text{ V}$	-	-	± 100	nA

ON STATE SPECIFICATIONS

$V_{GS(TH)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250 \mu\text{A}$ (Figure 10)	2	-	4	V
$r_{DS(ON)}$	Drain to Source On Resistance	$I_D = 75 \text{ A}$, $V_{GS} = 10 \text{ V}$ (Figure 9)	-	0.013	0.016	m Ω

THERMAL SPECIFICATIONS

$R_{\theta JC}$	Thermal Resistance Junction to Case	TO-247	-	-	0.30	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient		-	-	30	$^\circ\text{C/W}$

SWITCHING SPECIFICATIONS ($V_{GS} = 10 \text{ V}$)

t_{ON}	Turn-On Time	$V_{DD} = 75 \text{ V}$, $I_D \cong 75 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GS} = 2.0 \Omega$ (Figures 18, 19)	-	-	260	ns
$t_{d(ON)}$	Turn-On Delay Time		-	22	-	ns
t_r	Rise Time		-	151	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	82	-	ns
t_f	Fall Time		-	107	-	ns
t_{OFF}	Turn-Off Time		-	-	285	ns

GATE CHARGE SPECIFICATIONS

$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0 \text{ V}$ to 20 V	$V_{DD} = 75 \text{ V}$, $I_D = 75 \text{ A}$, $I_{g(REF)} = 1.0 \text{ mA}$ (Figures 13, 16, 17)	-	400	480	nC
$Q_{g(10)}$	Gate Charge at 10 V	$V_{GS} = 0 \text{ V}$ to 10 V		-	215	260	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0 \text{ V}$ to 2 V		-	15	17.5	nC
Q_{gs}	Gate to Source Gate Charge			-	25	-	nC
Q_{gd}	Gate to Drain "Miller" Charge			-	66	-	nC

CAPACITANCE SPECIFICATIONS

C_{ISS}	Input Capacitance	$V_{DS} = 25 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$ (Figure 12)	-	7690	-	pF
C_{OSS}	Output Capacitance		-	1650	-	pF
C_{RSS}	Reverse Transfer Capacitance		-	535	-	pF

SOURCE TO DRAIN DIODE SPECIFICATIONS

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 75 \text{ A}$	-	-	1.25	V
		$I_{SD} = 35 \text{ A}$	-	-	1.00	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 75 \text{ A}$, $dI_{SD}/dt = 100 \text{ A}/\mu\text{s}$	-	-	260	ns
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 75 \text{ A}$, $dI_{SD}/dt = 100 \text{ A}/\mu\text{s}$	-	-	183	nC

HUF75852G3

TYPICAL PERFORMANCE CURVES

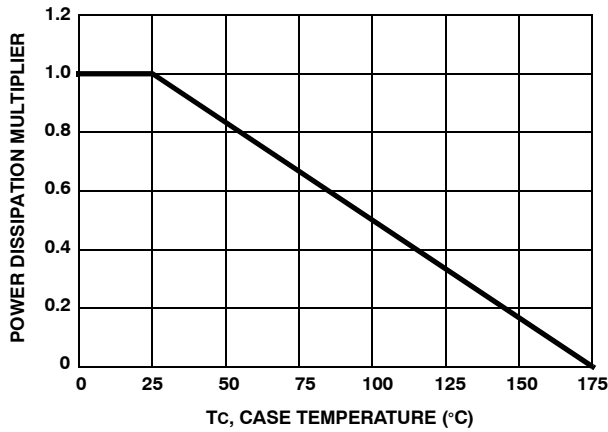


Figure 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

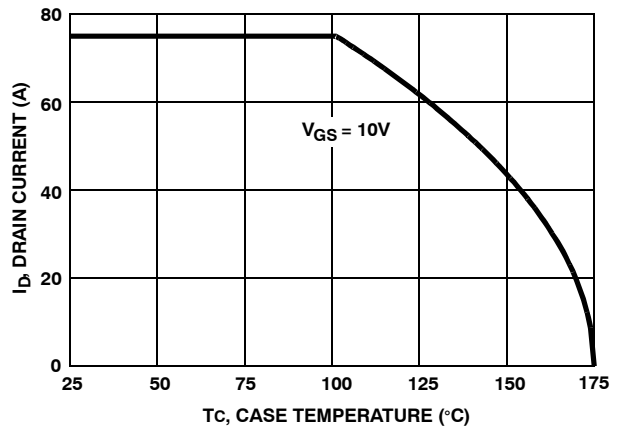


Figure 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

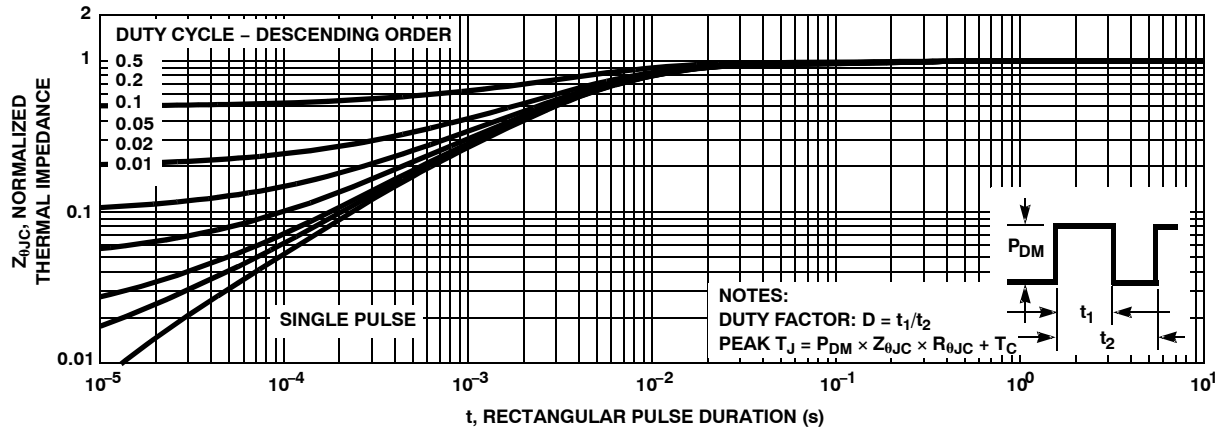


Figure 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

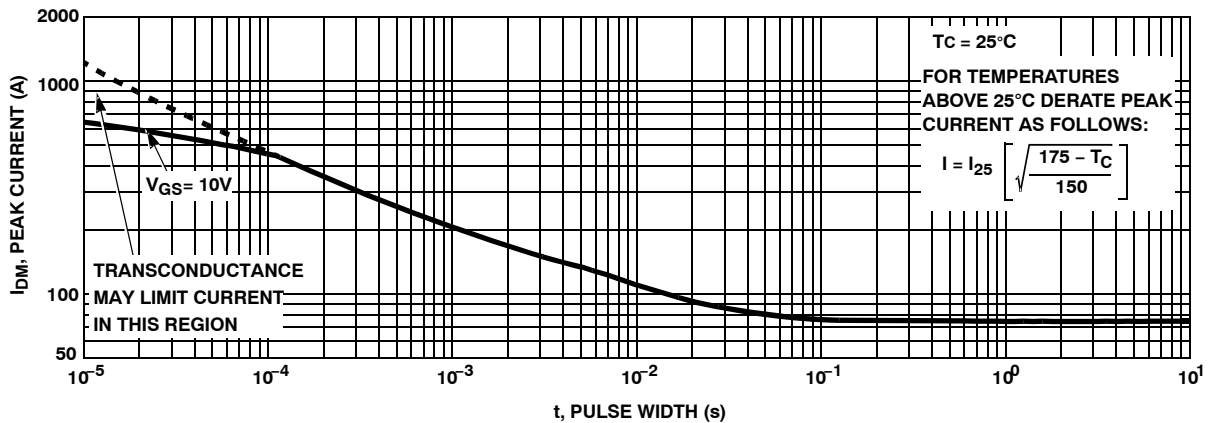


Figure 4. PEAK CURRENT CAPABILITY

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

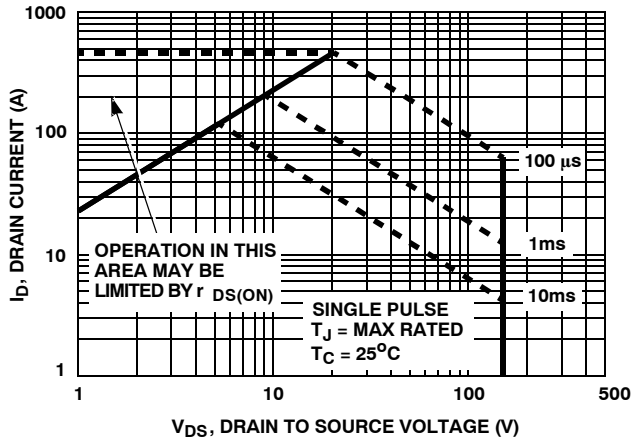
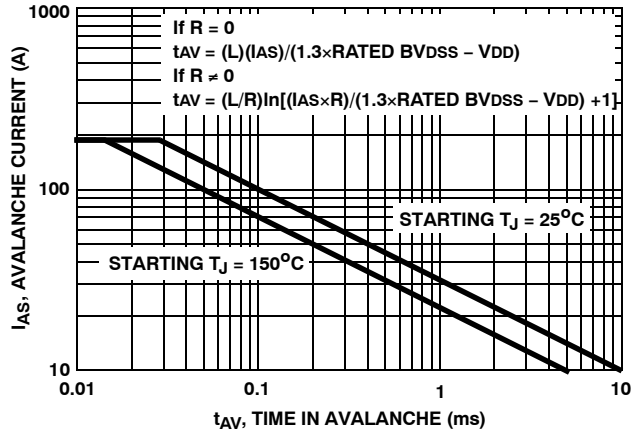


Figure 5. FORWARD BIAS SAFE OPERATING AREA



NOTE: Refer to Fairchild Application Notes AN9321 and AN9322.

Figure 6. UNCLAMPED INDUCTIVE SWITCHING CAPABILITY

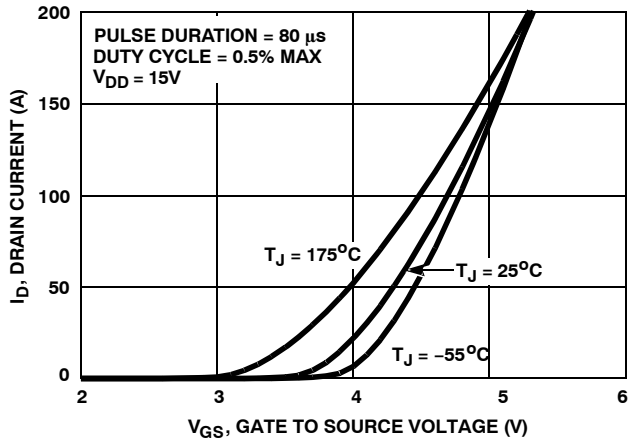


Figure 7. TRANSFER CHARACTERISTICS

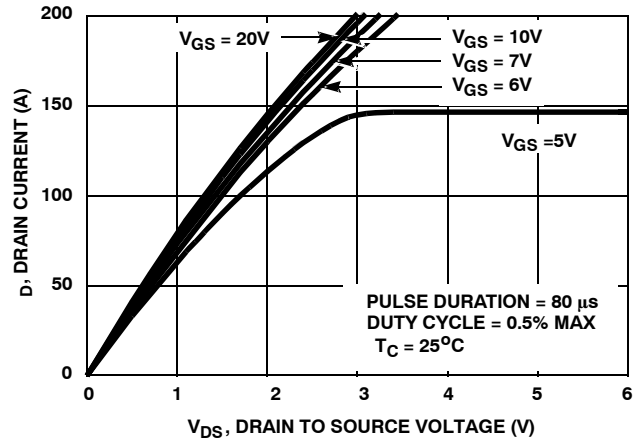


Figure 8. SATURATION CHARACTERISTICS

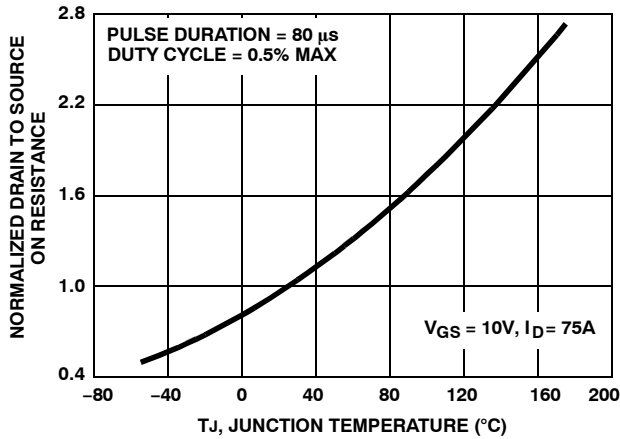


Figure 9. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

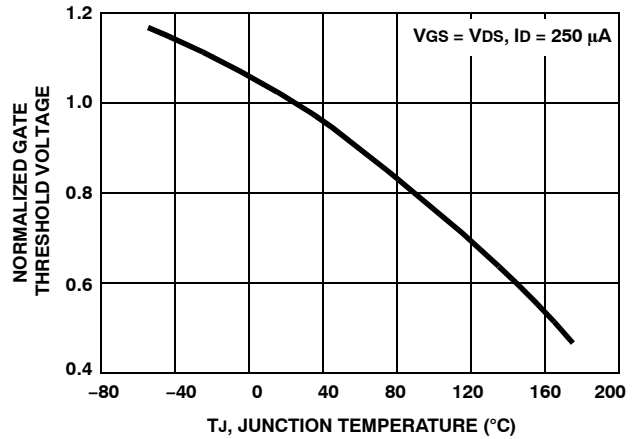


Figure 10. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

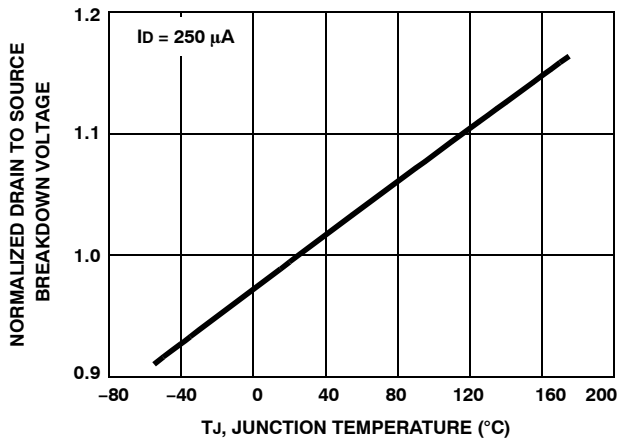


Figure 11. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE

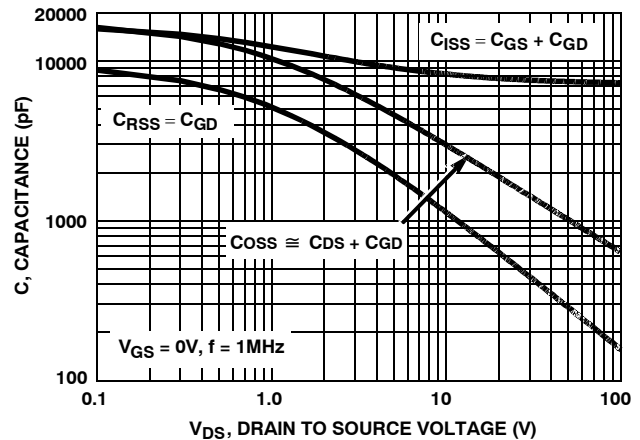
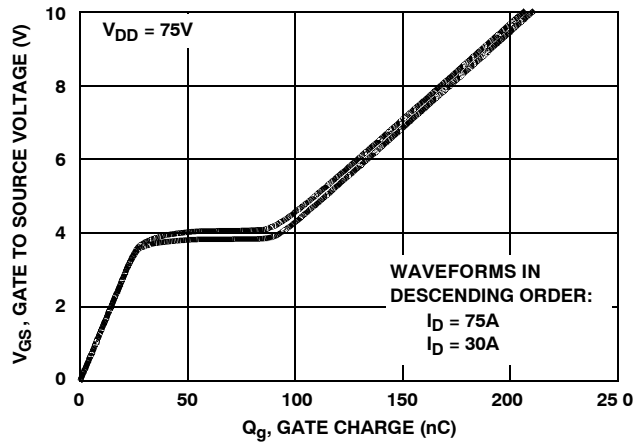


Figure 12. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Fairchild Application Notes AN7254 and AN7260.

Figure 13. GATE CHARGE WAVEFORMS FOR CONSTANT GATE CURRENT

TEST CIRCUITS AND WAVEFORMS

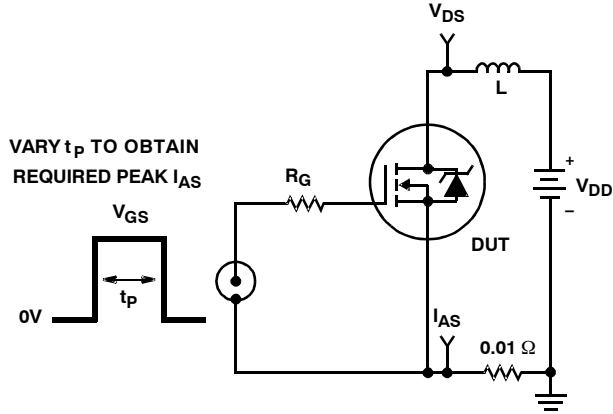


Figure 14. UNCLAMPED ENERGY TEST CIRCUIT



Figure 15. UNCLAMPED ENERGY WAVEFORMS

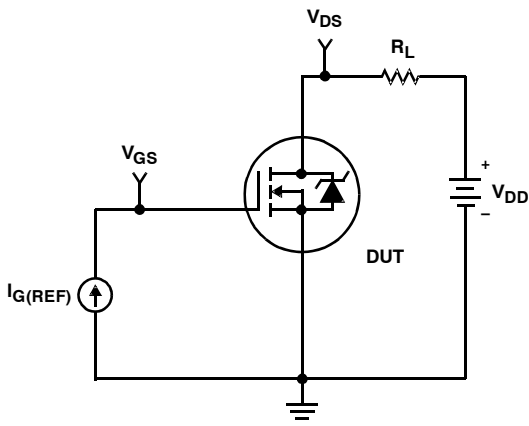


Figure 16. GATE CHARGE TEST CIRCUIT

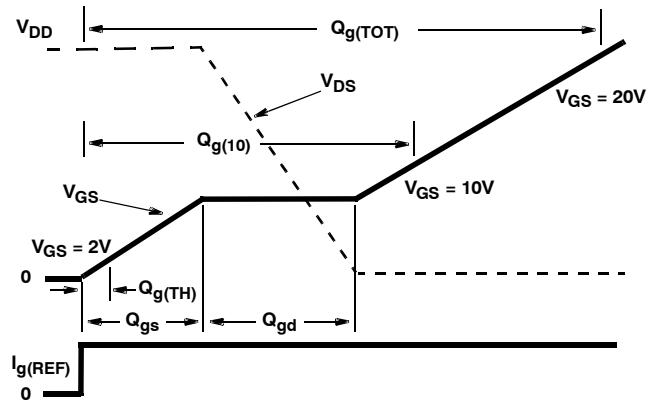


Figure 17. GATE CHARGE WAVEFORM

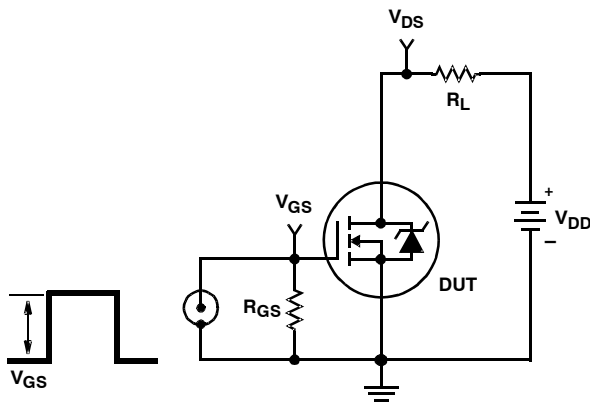


Figure 18. SWITCHING TIME TEST CIRCUIT

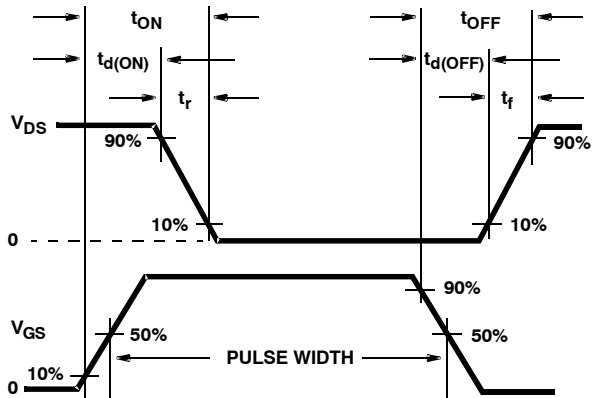


Figure 19. SWITCHING TIME WAVEFORM

HUF75852G3

PSPICE Electrical Model

.SUBCKT HUF75852 2 1 3 ; rev 26 Oct 1999

CA 12 8 12.0e-9
 CB 15 14 12.0e-9
 CIN 6 8 7.15e-9

DBODY 7 5 DBODYMOD
 DBREAK 5 11 DBREAKMOD
 DPLCAP 10 5 DPLCAPMOD

EBREAK 11 7 17 18 159.2
 EDS 14 8 5 8 1
 EGS 13 8 6 8 1
 ESG 6 10 6 8 1
 EVTHRES 6 21 19 8 1
 EVTEMP 20 6 18 22 1

IT 8 17 1

LDRAIN 2 5 1.0e-9
 LGATE 1 9 7.46e-9
 LSOURCE 3 7 3.87e-9

MMED 16 6 8 8 MMEDMOD
 MSTRO 16 6 8 8 MSTROMOD
 MWEAK 16 21 8 8 MWEAKMOD

RBREAK 17 18 RBREAKMOD 1
 RDRAIN 50 16 RDRAINMOD 9.50e-3
 RGATE 9 20 0.80
 RLDRAIN 2 5 10
 RLGATE 1 9 74.6
 RLSOURCE 3 7 38.7
 RSLC1 5 51 RSLC1MOD 1e-6
 RSLC2 5 50 1e3
 RSOURCE 8 7 RSOURCEMOD 2.37e-3
 RVTHRES 22 8 RVTHRESMOD 1
 RVTEMP 18 19 RVTEMPMOD 1

S1A 6 12 13 8 S1AMOD
 S1B 13 12 13 8 S1BMOD
 S2A 6 15 14 13 S2AMOD
 S2B 13 15 14 13 S2BMOD

VBAT 22 19 DC 1

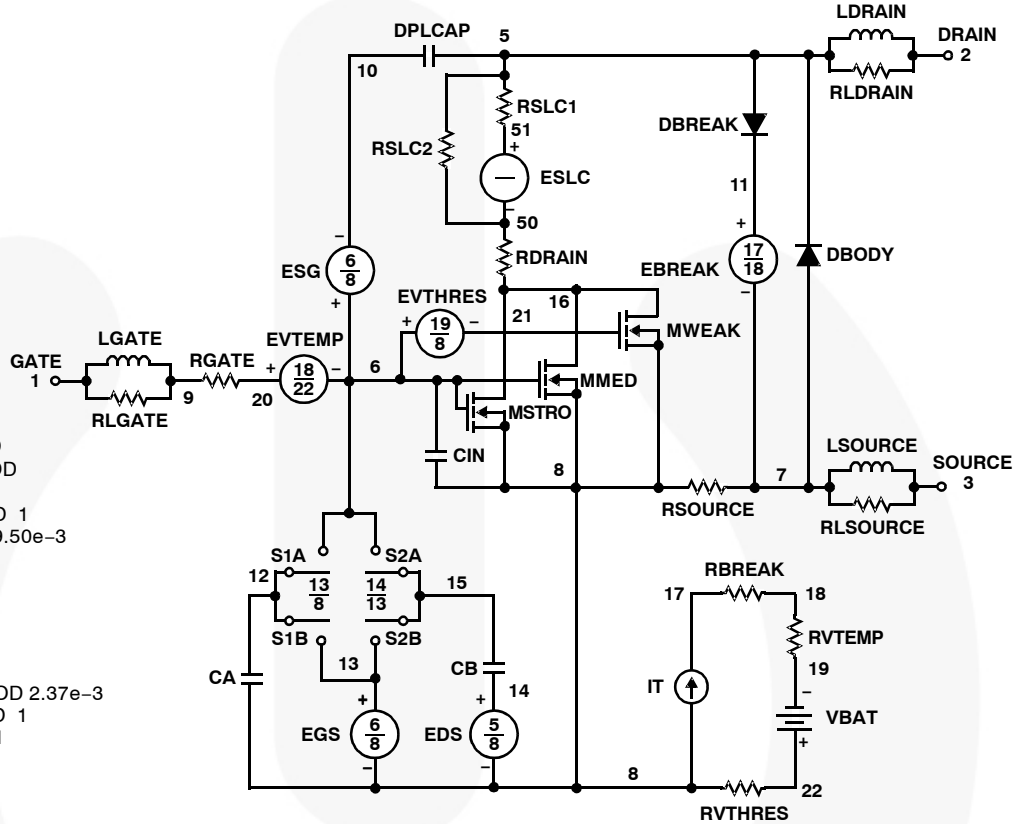
ESLC 51 50 VALUE={{(V(5,51) / ABS(V(5,51))) * (PWR(V(5,51)) / (1e-6*245), 2.5)}}

.MODEL DBODYMOD D (IS = 6.03e-12 RS = 2.17e-3 TRS1 = 1.97e-3 TRS2 = 1.03e-6 CJO = 7.91e-9 TT = 1.69e-7 M = 0.60)
 .MODEL DBREAKMOD D (RS = 3.53e-1 TRS1 = 0 TRS2 = 0)
 .MODEL DPLCAPMOD D (CJO = 9.52e-9 IS = 1e-3 0N = 1 M = 0.88)
 .MODEL MMEDMOD NMOS (VTO = 3.05 KP = 8.50 IS = 1e-30 N = 10 TOX = 1 L = 1u W = 1u RG = 0.80)
 .MODEL MSTROMOD NMOS (VTO = 3.53 KP = 215 IS = 1e-30 N = 10 TOX = 1 L = 1u W = 1u)
 .MODEL MWEAKMOD NMOS (VTO = 2.63 KP = 0.075 IS = 1e-30 N = 10 TOX = 1 L = 1u W = 1u RG = 8.0)
 .MODEL RBREAKMOD RES (TC1 = 1.12e-3 TC2 = -1.00e-7)
 .MODEL RDRAINMOD RES (TC1 = 1.03e-2 TC2 = 3.04e-5)
 .MODEL RSLC1MOD RES (TC1 = 2.52e-3 TC2 = 0)
 .MODEL RSLC2MOD RES (TC1 = 1.01e-3 TC2 = 0)
 .MODEL RSOURCEMOD RES (TC1 = -3.65e-3 TC2 = -1.55e-5)
 .MODEL RVTHRESMOD RES (TC1 = -2.85e-3 TC2 = 0)

.MODEL S1AMOD VSWITCH (RON = 1e-5 ROFF = 0.1 VON = -3.5 VOFF = -3.0)
 .MODEL S1BMOD VSWITCH (RON = 1e-5 ROFF = 0.1 VON = -3.0 VOFF = -3.5)
 .MODEL S2AMOD VSWITCH (RON = 1e-5 ROFF = 0.1 VON = -2.5 VOFF = -0.5)
 .MODEL S2BMOD VSWITCH (RON = 1e-5 ROFF = 0.1 VON = -0.5 VOFF = -2.5)

.ENDS

NOTE: For further discussion of the PSPICE model, consult **A New PSPICE Sub-Circuit for the Power MOSFET Featuring Global Temperature Options**; IEEE Power Electronics Specialist Conference Records, 1991, written by William J. Hepp and C. Frank W. Heatley.



SPICE Thermal Model

REV 19 Oct 1999

HUF75852T

CTHERM1 th 6 9.75e-3
 CTHERM2 6 5 3.90e-2
 CTHERM3 5 4 2.50e-2
 CTHERM4 4 3 2.95e-2
 CTHERM5 3 2 6.55e-2
 CTHERM6 2 tl 12.55

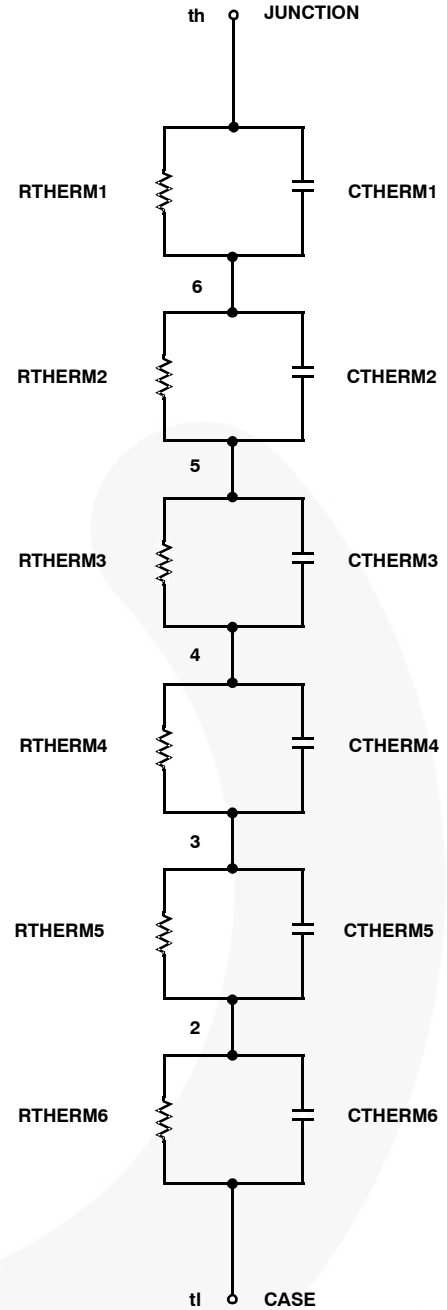
RTHERM1 th 6 1.96e-3
 RTHERM2 6 5 4.89e-3
 RTHERM3 5 4 1.38e-2
 RTHERM4 4 3 7.73e-2
 RTHERM5 3 2 1.17e-1
 RTHERM6 2 tl 1.55e-2

SABER Thermal Model

SABER thermal model HUF75852T

```
template thermal_model th tl
thermal_c th, tl
{
    ctherm.ctherm1 th 6 = 9.75e-3
    ctherm.ctherm2 6 5 = 3.90e-2
    ctherm.ctherm3 5 4 = 2.50e-2
    ctherm.ctherm4 4 3 = 2.95e-2
    ctherm.ctherm5 3 2 = 6.55e-2
    ctherm.ctherm6 2 tl = 12.55

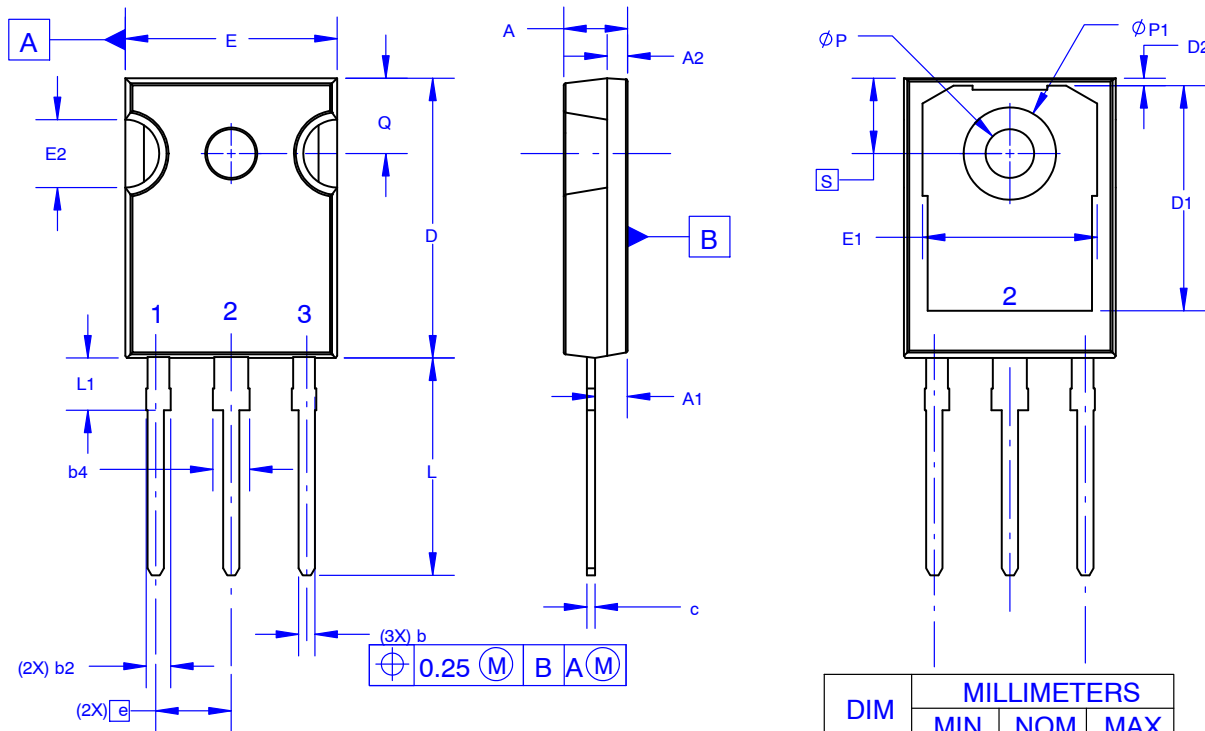
    rtherm.rtherm1 th 6 = 1.96e-3
    rtherm.rtherm2 6 5 = 4.89e-3
    rtherm.rtherm3 5 4 = 1.38e-2
    rtherm.rtherm4 4 3 = 7.73e-2
    rtherm.rtherm5 3 2 = 1.17e-1
    rtherm.rtherm6 2 tl = 1.55e-2
}
```



PSPICE is a trademark of MicroSim Corporation.
 Saber is a registered trademark of Sabremark Limited Partnership.

TO-247-3LD SHORT LEAD
CASE 340CK
ISSUE A

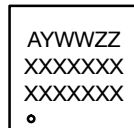
DATE 31 JAN 2019



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

GENERIC
MARKING DIAGRAM*



- XXXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
b4	2.42	2.54	2.66
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	5.56	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
∅P	3.51	3.58	3.65
∅P1	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

DOCUMENT NUMBER:	98AON13851G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-247-3LD SHORT LEAD	PAGE 1 OF 1

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales