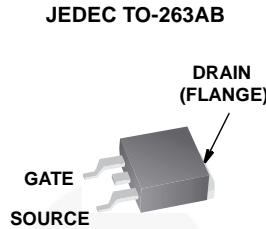
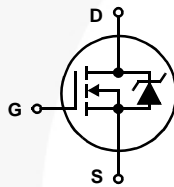


N-Channel Logic Level UltraFET Power MOSFET
60 V, 44 A, 25 mΩ

Packaging



Symbol



Features

- Ultra Low On-Resistance
 - $r_{DS(ON)} = 0.022\Omega, V_{GS} = 10V$
 - $r_{DS(ON)} = 0.025\Omega, V_{GS} = 5V$
- Simulation Models
 - Temperature Compensated PSPICE® and SABER™ Electrical Models
 - Spice and SABER Thermal Impedance Models
 - www.fairchildsemi.com
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- Switching Time vs R_{GS} Curves

Ordering Information

PART NUMBER	PACKAGE	BRAND
HUF76429S3ST	TO-263AB	76429S

Absolute Maximum Ratings $T_C = 25^\circ C$, Unless Otherwise Specified

	HUF76429S3ST	UNITS
Drain to Source Voltage (Note 1)	60	V
Drain to Gate Voltage ($R_{GS} = 20k\Omega$) (Note 1)	60	V
Gate to Source Voltage	± 16	V
Drain Current		
Continuous ($T_C = 25^\circ C, V_{GS} = 5V$)	44	A
Continuous ($T_C = 25^\circ C, V_{GS} = 10V$) (Figure 2)	47	A
Continuous ($T_C = 100^\circ C, V_{GS} = 5V$)	31	A
Continuous ($T_C = 100^\circ C, V_{GS} = 4.5V$) (Figure 2)	30	A
Pulsed Drain Current	I_{DM}	Figure 4
Pulsed Avalanche Rating	UIS	Figures 6, 17, 18
Power Dissipation	110	W
Derate Above $25^\circ C$	0.74	W/ $^\circ C$
Operating and Storage Temperature	T_J, T_{STG}	-55 to 175 $^\circ C$
Maximum Temperature for Soldering		
Leads at 0.063in (1.6mm) from Case for 10s.	T_L	300 $^\circ C$
Package Body for 10s, See Techbrief TB334.	T_{pkg}	260 $^\circ C$

NOTES:

1. $T_J = 25^\circ C$ to $150^\circ C$.

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Product reliability information can be found at <http://www.fairchildsemi.com/products/discrete/reliability/index.html>

For severe environments, see our Automotive HUFA series.

All Fairchild semiconductor products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems certification.

HUF76429S3S

Electrical Specifications $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS	
OFF STATE SPECIFICATIONS							
Drain to Source Breakdown Voltage	BV_{DSS}	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$ (Figure 12)	60	-	-	V	
		$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$, $T_C = -40^\circ\text{C}$ (Figure 12)	55	-	-	V	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 55\text{V}$, $V_{GS} = 0\text{V}$	-	-	1	μA	
		$V_{DS} = 50\text{V}$, $V_{GS} = 0\text{V}$, $T_C = 150^\circ\text{C}$	-	-	250	μA	
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 16\text{V}$	-	-	± 100	nA	
ON STATE SPECIFICATIONS							
Gate to Source Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$ (Figure 11)	1	-	3	V	
Drain to Source On Resistance	$r_{DS(ON)}$	$I_D = 47\text{A}$, $V_{GS} = 10\text{V}$ (Figures 9, 10)	-	0.018	0.022	Ω	
		$I_D = 31\text{A}$, $V_{GS} = 5\text{V}$ (Figure 9)	-	0.021	0.025	Ω	
		$I_D = 30\text{A}$, $V_{GS} = 4.5\text{V}$ (Figure 9)	-	0.022	0.027	Ω	
THERMAL SPECIFICATIONS							
Thermal Resistance Junction to Case	$R_{\theta JC}$	TO-263	-	-	1.36	$^\circ\text{C/W}$	
Thermal Resistance Junction to Ambient	$R_{\theta JA}$		-	-	62	$^\circ\text{C/W}$	
SWITCHING SPECIFICATIONS ($V_{GS} = 4.5\text{V}$)							
Turn-On Time	t_{ON}	$V_{DD} = 30\text{V}$, $I_D = 30\text{A}$ $V_{GS} = 4.5\text{V}$, $R_{GS} = 7.5\Omega$ (Figures 15, 21, 22)	-	-	325	ns	
Turn-On Delay Time	$t_{d(ON)}$		-	13	-	ns	
Rise Time	t_r		-	203	-	ns	
Turn-Off Delay Time	$t_{d(OFF)}$		-	30	-	ns	
Fall Time	t_f		-	74	-	ns	
Turn-Off Time	t_{OFF}		-	-	155	ns	
SWITCHING SPECIFICATIONS ($V_{GS} = 10\text{V}$)							
Turn-On Time	t_{ON}	$V_{DD} = 30\text{V}$, $I_D = 47\text{A}$ $V_{GS} = 10\text{V}$, $R_{GS} = 8.2\Omega$ (Figures 16, 21, 22)	-	-	160	ns	
Turn-On Delay Time	$t_{d(ON)}$		-	7.8	-	ns	
Rise Time	t_r		-	100	-	ns	
Turn-Off Delay Time	$t_{d(OFF)}$		-	51	-	ns	
Fall Time	t_f		-	104	-	ns	
Turn-Off Time	t_{OFF}		-	-	235	ns	
GATE CHARGE SPECIFICATIONS							
Total Gate Charge	$Q_{g(TOT)}$	$V_{GS} = 0\text{V}$ to 10V	$V_{DD} = 30\text{V}$, $I_D = 31\text{A}$, $I_{g(REF)} = 1.0\text{mA}$ (Figures 14, 19, 20)	-	38	46	nC
Gate Charge at 5V	$Q_{g(5)}$	$V_{GS} = 0\text{V}$ to 5V		-	21	25	nC
Threshold Gate Charge	$Q_{g(TH)}$	$V_{GS} = 0\text{V}$ to 1V		-	1.3	1.6	nC
Gate to Source Gate Charge	Q_{gs}			-	3.8	-	nC
Gate to Drain "Miller" Charge	Q_{gd}			-	9.7	-	nC
CAPACITANCE SPECIFICATIONS							
Input Capacitance	C_{ISS}	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$ (Figure 13)	-	1480	-	pF	
Output Capacitance	C_{OSS}		-	440	-	pF	
Reverse Transfer Capacitance	C_{RSS}		-	90	-	pF	

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage	V_{SD}	$I_{SD} = 44\text{A}$	-	-	1.25	V
		$I_{SD} = 22\text{A}$	-	-	1.00	V
Reverse Recovery Time	t_{rr}	$I_{SD} = 31\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	98	ns
Reverse Recovered Charge	Q_{RR}	$I_{SD} = 31\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	230	nC

Typical Performance Curves

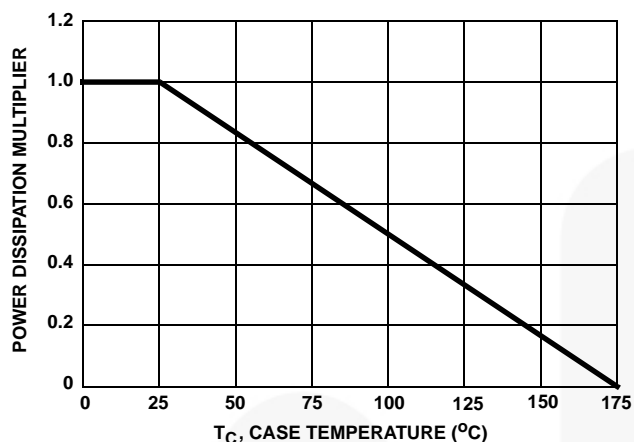


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

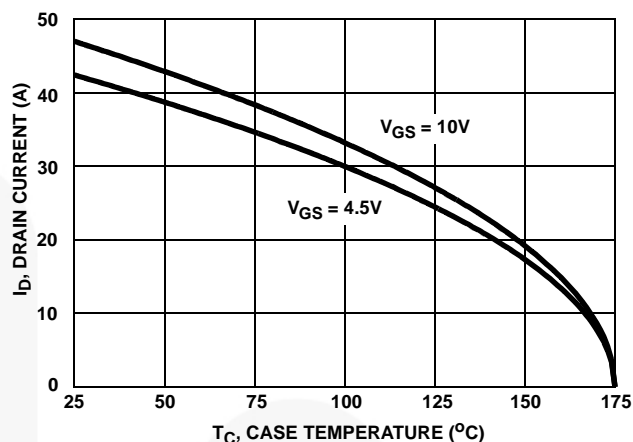


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

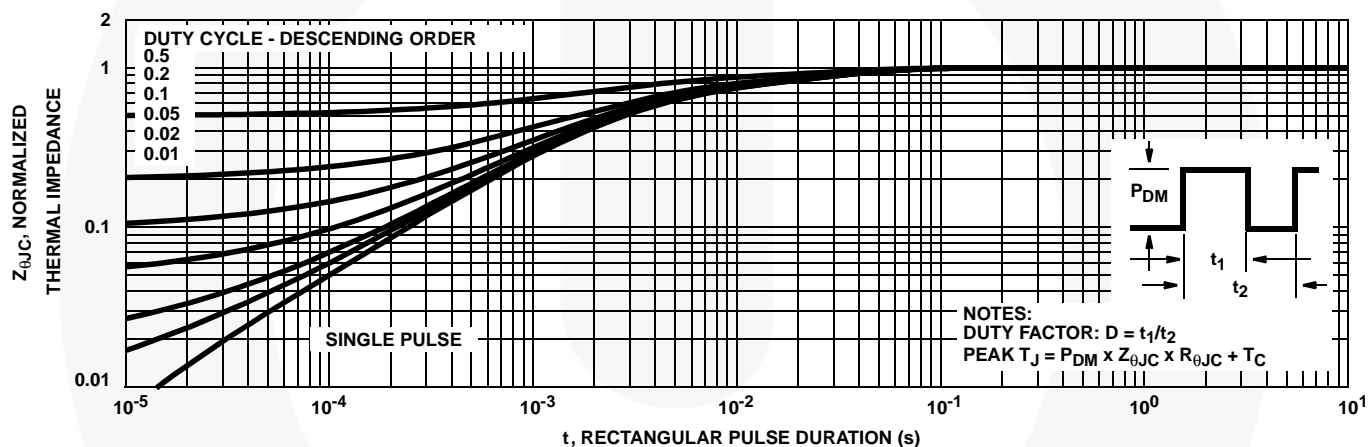


FIGURE 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

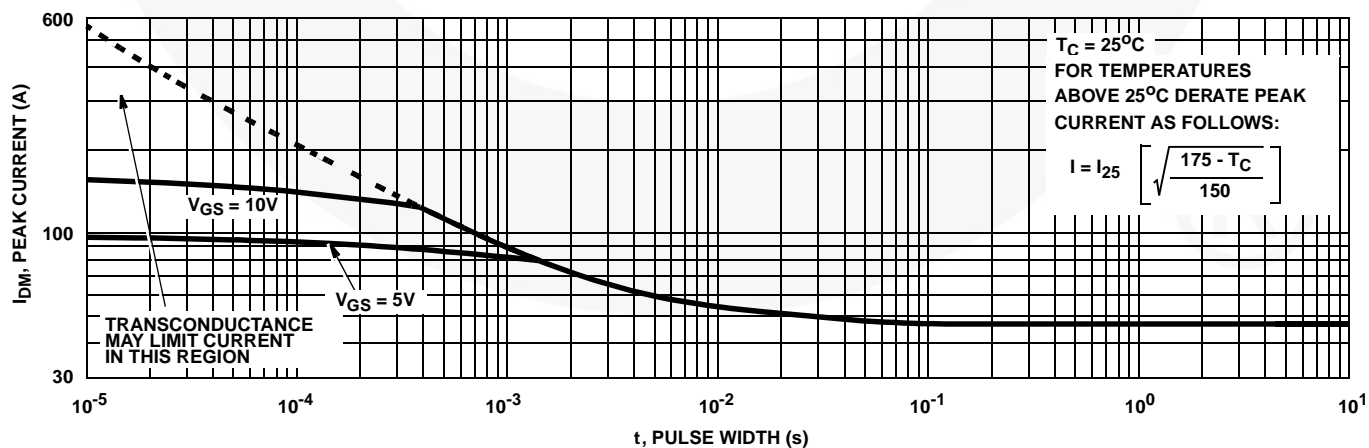


FIGURE 4. PEAK CURRENT CAPABILITY

Typical Performance Curves (Continued)

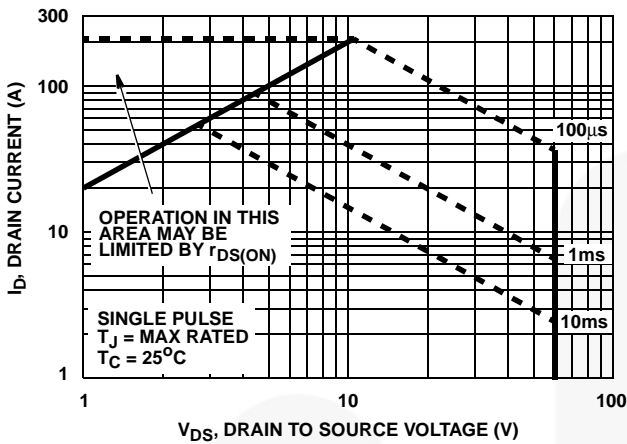
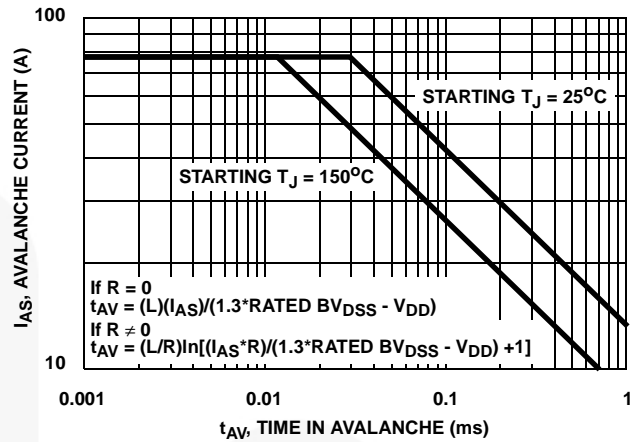


FIGURE 5. FORWARD BIAS SAFE OPERATING AREA



NOTE: Refer to Fairchild Application Notes AN9321 and AN9322.

FIGURE 6. UNCLAMPED INDUCTIVE SWITCHING CAPABILITY

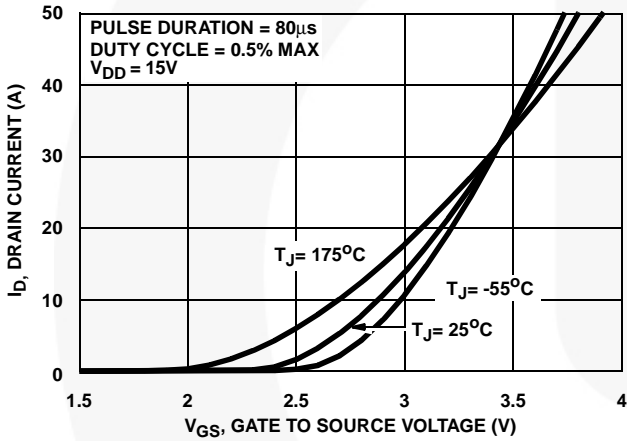


FIGURE 7. TRANSFER CHARACTERISTICS

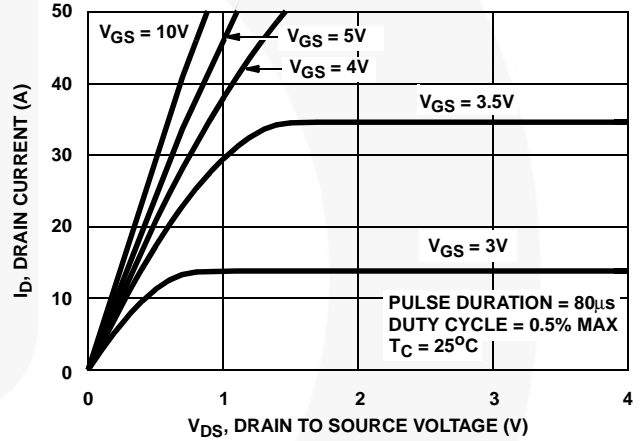


FIGURE 8. SATURATION CHARACTERISTICS

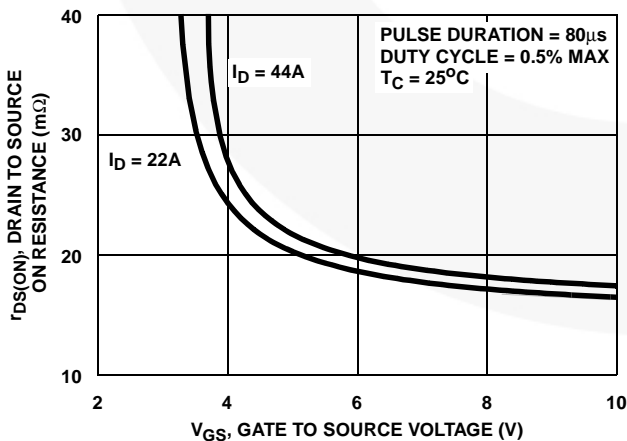


FIGURE 9. DRAIN TO SOURCE ON RESISTANCE vs. GATE VOLTAGE AND DRAIN CURRENT

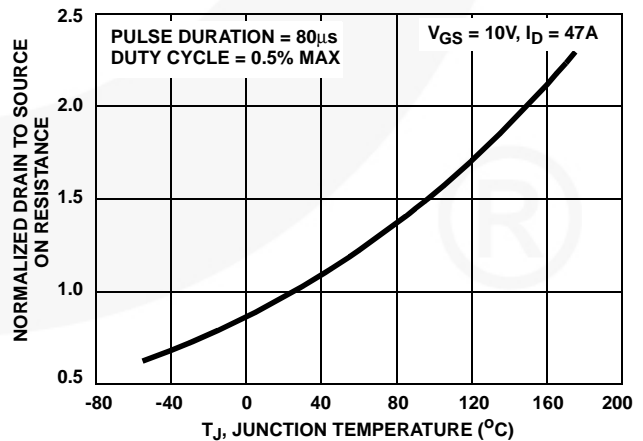


FIGURE 10. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs. JUNCTION TEMPERATURE

Typical Performance Curves (Continued)

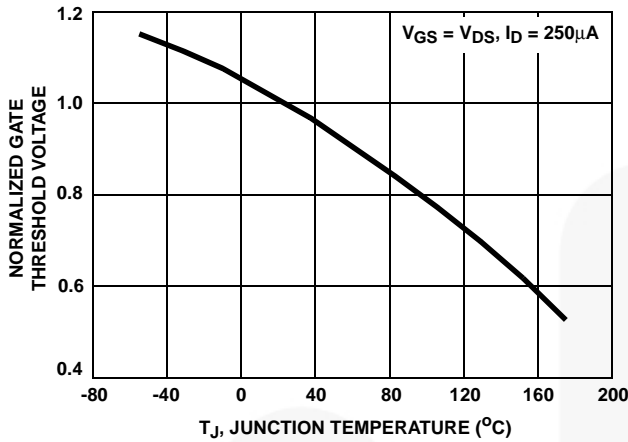


FIGURE 11. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

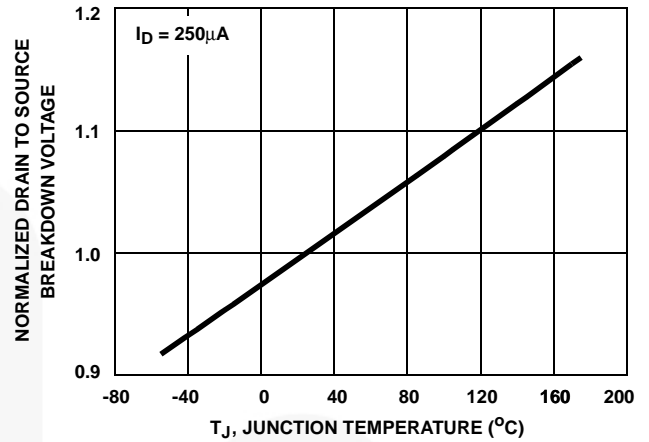


FIGURE 12. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE

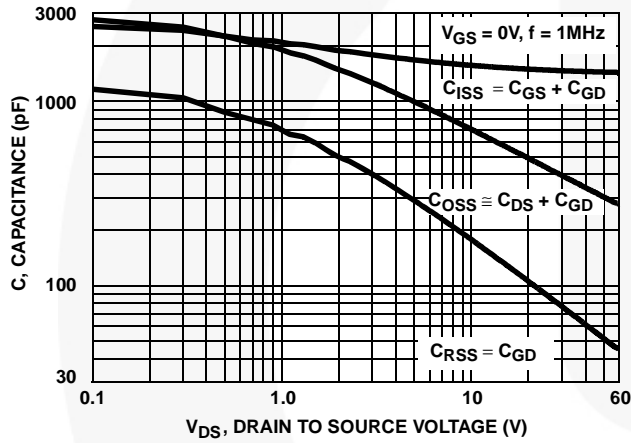
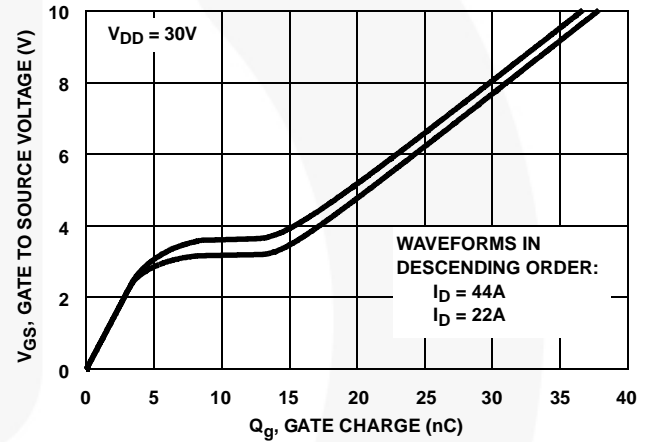


FIGURE 13. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Fairchild Application Notes AN7254 and AN7260.

FIGURE 14. GATE CHARGE WAVEFORMS FOR CONSTANT GATE CURRENT

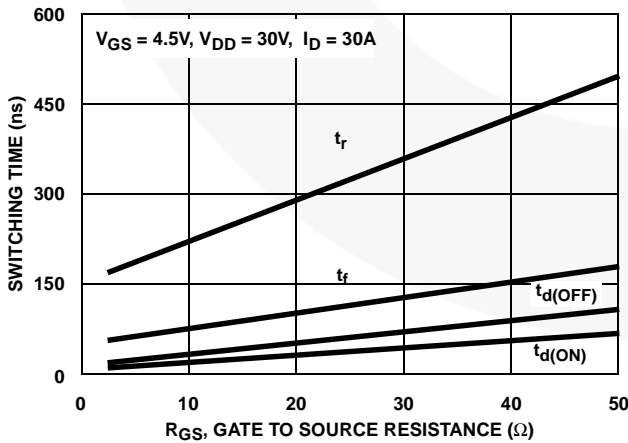


FIGURE 15. SWITCHING TIME vs GATE RESISTANCE

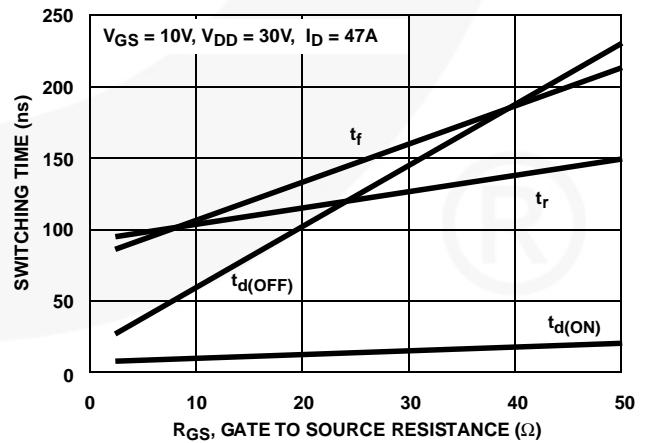


FIGURE 16. SWITCHING TIME vs GATE RESISTANCE

Test Circuits and Waveforms

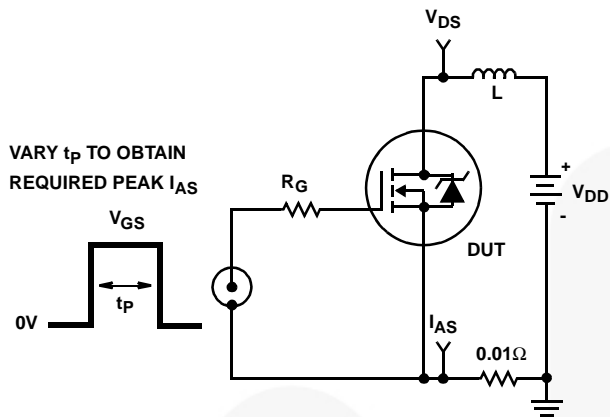


FIGURE 17. UNCLAMPED ENERGY TEST CIRCUIT

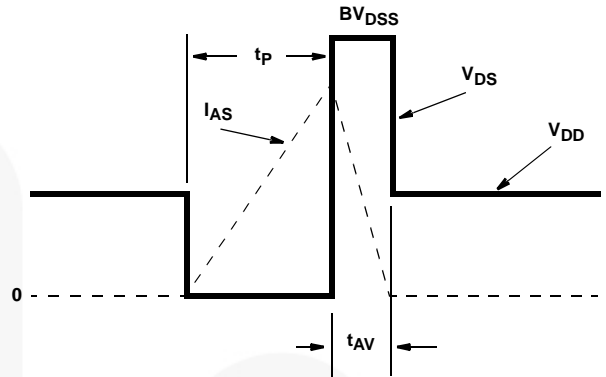


FIGURE 18. UNCLAMPED ENERGY WAVEFORMS

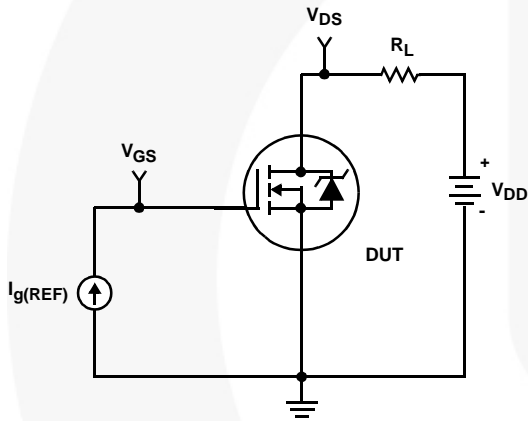


FIGURE 19. GATE CHARGE TEST CIRCUIT

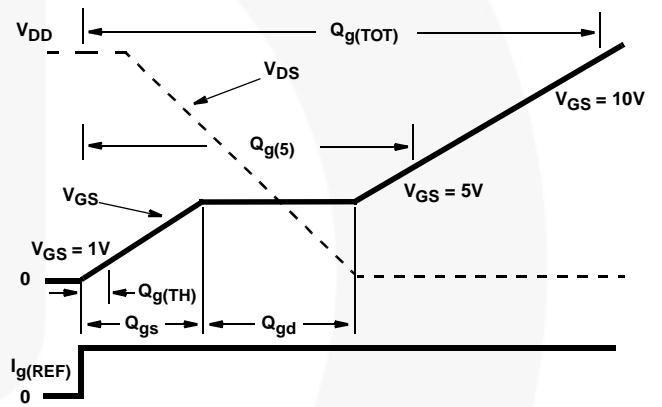


FIGURE 20. GATE CHARGE WAVEFORMS

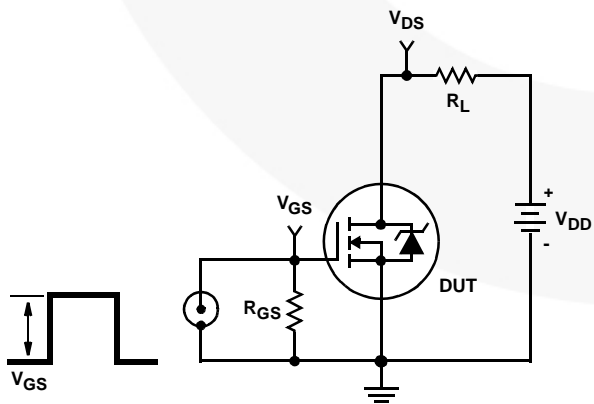


FIGURE 21. SWITCHING TIME TEST CIRCUIT

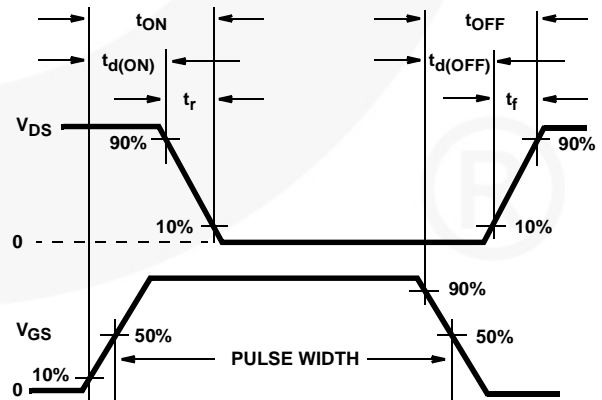


FIGURE 22. SWITCHING TIME WAVEFORM

SABER Electrical Model

REV 25 June 1999

template huf76429 n2,n1,n3
electrical n2,n1,n3

```
{
var i iscl
d..model dbodymod = (is = 1.28e-12, cjo = 1.68e-9, tt = 6.14e-8, xti = 4.35, m = 0.48)
d..model dbreakmod = ()
d..model dplcapmod = (cjo = 1.23e-9, is = 1e-30, n = 10, m = 0.8)
m..model mmedmod = (type=_n, vto = 1.98, kp = 3.2, is = 1e-30, tox = 1)
m..model mstrongmod = (type=_n, vto = 2.30, kp = 67, is = 1e-30, tox = 1)
m..model mweakmod = (type=_n, vto = 1.72, kp = 0.08, is = 1e-30, tox = 1)
sw_vcsp..model s1amod = (ron = 1e-5, roff = 0.1, von = -6.2, voff = -2.4)
sw_vcsp..model s1bmod = (ron = 1e-5, roff = 0.1, von = -2.4, voff = -6.2)
sw_vcsp..model s2amod = (ron = 1e-5, roff = 0.1, von = -1.1, voff = 0.5)
sw_vcsp..model s2bmod = (ron = 1e-5, roff = 0.1, von = 0.5, voff = -1.1)
```

```
c.ca n12 n8 = 1.95e-9
c.cb n15 n14 = 1.95e-9
c.cin n6 n8 = 1.39e-9
```

```
d.dbody n7 n71 = model=dbodymod
d.dbreak n72 n11 = model=dbreakmod
d.dplcap n10 n5 = model=dplcapmod
```

```
i.it n8 n17 = 1
```

```
l.ldrain n2 n5 = 1e-9
l.lgate n1 n9 = 5.80e-9
l.lsource n3 n7 = 4.57e-9
```

```
m.mmed n16 n6 n8 n8 = model=mmedmod, l=1u, w=1u
m.mstrong n16 n6 n8 n8 = model=mstrongmod, l=1u, w=1u
m.mweak n16 n21 n8 n8 = model=mweakmod, l=1u, w=1u
```

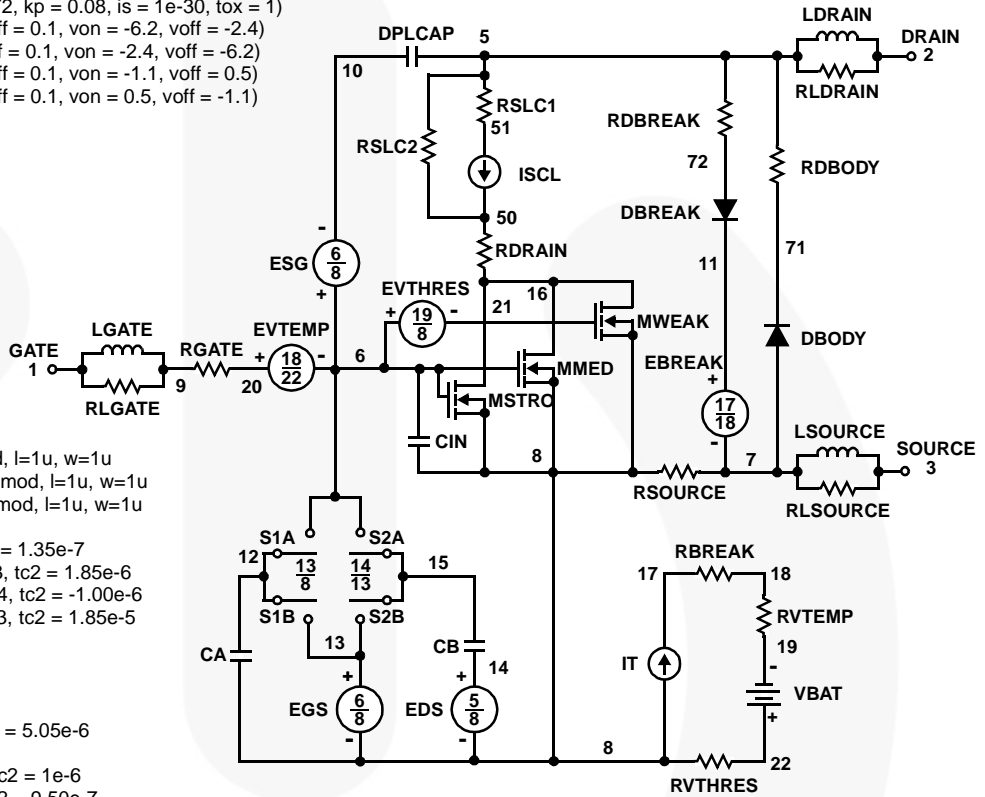
```
res.rbreak n17 n18 = 1, tc1 = 1.08e-3, tc2 = 1.35e-7
res.rbody n71 n5 = 5.25e-3, tc1 = 1.78e-3, tc2 = 1.85e-6
res.rdbreak n72 n5 = 2.27e-1, tc1 = 9.10e-4, tc2 = -1.00e-6
res.rdrain n50 n16 = 7.80e-3, tc1 = 8.25e-3, tc2 = 1.85e-5
res.rgate n9 n20 = 2.80
res.rldrain n2 n5 = 10
res.rlgate n1 n9 = 54.2
res.rlsource n3 n7 = 41.6
res.rslc1 n5 n51 = 1e-6, tc1 = 4.97e-3, tc2 = 5.05e-6
res.rslc2 n5 n50 = 1e3
res.rsource n8 n7 = 6.5e-3, tc1 = 1.5e-3, tc2 = 1e-6
res.rvtemp n18 n19 = 1, tc1 = -1.72e-3, tc2 = 9.50e-7
res.rvthres n22 n8 = 1, tc1 = -1.85e-3, tc2 = -9.48e-6
```

```
spe.ebreak n11 n7 n17 n18 = 68.05
spe.eds n14 n8 n5 n8 = 1
spe.egs n13 n8 n6 n8 = 1
spe.esg n6 n10 n6 n8 = 1
spe.evtemp n20 n6 n18 n22 = 1
spe.evthres n6 n21 n19 n8 = 1
```

```
sw_vcsp.s1a n6 n12 n13 n8 = model=s1amod
sw_vcsp.s1b n13 n12 n13 n8 = model=s1bmod
sw_vcsp.s2a n6 n15 n14 n13 = model=s2amod
sw_vcsp.s2b n13 n15 n14 n13 = model=s2bmod
```

```
v.vbat n22 n19 = dc=1
```

```
equations {
i (n51->n50) +=iscl
iscl: v(n51,n50) = ((v(n5,n51))/(1e-9+abs(v(n5,n51))))*((abs(v(n5,n51))*1e6/117)** 3)
}
}
```



SPICE Thermal Model

REV 2 August 1999

HUF76429

CTHERM1 th 6 2.45e-3
 CTHERM2 6 5 8.15e-3
 CTHERM3 5 4 7.40e-3
 CTHERM4 4 3 7.45e-3
 CTHERM5 3 2 1.01e-2
 CTHERM6 2 tl 7.49e-2

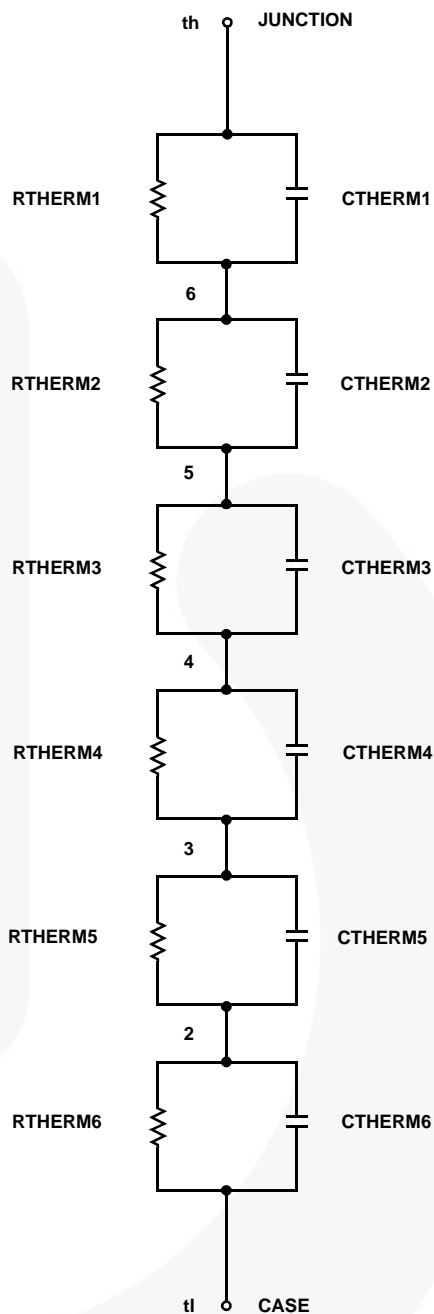
RTHERM1 th 6 9.00e-3
 RTHERM2 6 5 1.80e-2
 RTHERM3 5 4 9.15e-2
 RTHERM4 4 3 2.43e-1
 RTHERM5 3 2 3.50e-1
 RTHERM6 2 tl 3.62e-1

SABER Thermal Model

SABER thermal model HUF76429

```
template thermal_model th tl
thermal_c th, tl
{
    ctherm.ctherm1 th 6 = 2.45e-3
    ctherm.ctherm2 6 5 = 8.15e-3
    ctherm.ctherm3 5 4 = 7.40e-3
    ctherm.ctherm4 4 3 = 7.45e-3
    ctherm.ctherm5 3 2 = 1.01e-2
    ctherm.ctherm6 2 tl = 7.49e-2
```



```
rtherm.rtherm1 th 6 = 9.00e-3
rtherm.rtherm2 6 5 = 1.80e-2
rtherm.rtherm3 5 4 = 9.15e-2
rtherm.rtherm4 4 3 = 2.43e-1
rtherm.rtherm5 3 2 = 3.50e-1
rtherm.rtherm6 2 tl = 3.62e-1
}
```





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CorePLUS™	Green FPS™	QS™	TinyCalc™
CorePOWER™	Green FPS™ e-Series™	Quiet Series™	TinyLogic®
CROSSVOLT™	Gmax™	RapidConfigure™	TINYOPTO™
CTL™	GTO™	Saving our world, 1mW/W/kW at a time™	TinyPower™
Current Transfer Logic™	IntelliMAX™	SignalWise™	TinyPWM™
DEUXPEED®	ISOPLANAR™	SmartMax™	TinyWire™
Dual Cool™	Marking Small Speakers Sound Louder and Better™	SMART START™	TranSiC™
EcoSPARK®	MegaBuck™	Solutions for Your Success™	TriFault Detect™
EfficientMax™	MICROCOUPLER™	SPM®	TRUECURRENT®*
ESBC™	MicroFET™	STEALTH™	µSerDes™
 Fairchild®	MicroPak™	SuperFET®	 SerDes™
Fairchild Semiconductor®	MicroPak2™	SuperSOT™-3	UHC®
FACT Quiet Series™	MillerDrive™	SuperSOT™-6	Ultra FRFET™
FACT®	MotionMax™	SuperSOT™-8	UniFET™
FAST®	mWSaver®	SupreMOS®	VCX™
FastvCore™	OptoHiT™	SyncFET™	VisualMax™
FETBench™	OPTOLOGIC®		VoltagePlus™
FPS™	OPTOPLANAR®		XS™

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- A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.Fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufactures of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed application, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address and warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. 166

AMEYA360

Components Supply Platform

Authorized Distribution Brand :



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Welcome to visit www.ameya360.com

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