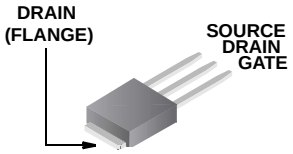
[redacted]

20A, 60V, 0.037 Ohm, N-Channel, Logic Level UltraFET® Power MOSFETFairchild

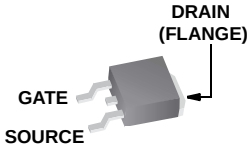
Packaging

JEDEC TO-251AA



HUF76423D3

JEDEC TO-252AA

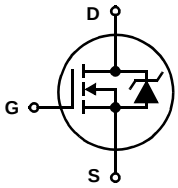


HUF76423D3S

Features

- Ultra Low On-Resistance
  - $r_{DS(ON)} = 0.032\Omega$, $V_{GS} = 10V$
  - $r_{DS(ON)} = 0.037\Omega$, $V_{GS} = 5V$
- 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

Symbol



Ordering Information

PART NUMBER	PACKAGE	BRAND
HUF76423D3	TO-251AA	76423D
HUF76423D3S	TO-252AA	76423D

NOTE: When ordering, use the entire part number. Add the suffix T to obtain the variant in tape and reel, e.g., HUF76423D3ST.

Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

		HUF76423D3, HUF76423D3S	UNITS
Drain to Source Voltage (Note 1)	V_{DSS}	60	V
Drain to Gate Voltage ($R_{GS} = 20k\Omega$) (Note 1)	V_{DGR}	60	V
Gate to Source Voltage	V_{GS}	±16	V
Drain Current			
Continuous ($T_C = 25^oC$, $V_{GS} = 5V$)	I_D	20	A
Continuous ($T_C = 25^oC$, $V_{GS} = 10V$) (Figure 2)	I_D	20	A
Continuous ($T_C = 100^oC$, $V_{GS} = 5V$)	I_D	20	A
Continuous ($T_C = 100^oC$, $V_{GS} = 4.5V$) (Figure 2)	I_D	20	A
Pulsed Drain Current	I_{DM}	Figure 4	
Pulsed Avalanche Rating	UIS	Figures 6, 17, 18	
Power Dissipation	P_D	85	W
Derate Above 25^oC		0.567	$W/^oC$
Operating and Storage Temperature	T_J, T_{STG}	-55 to 175	^oC
Maximum Temperature for Soldering			
Leads at 0.063in (1.6mm) from Case for 10s	T_L	300	^oC
Package Body for 10s, See Techbrief TB334	T_{pkg}	260	^oC

NOTES:

1. $T_J = 25^oC$ to 150^oC.

Electrical Specifications $T_C = 25^oC$, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
OFF STATE SPECIFICATIONS						
Drain to Source Breakdown Voltage	BV_{DSS}	I_D = 250µA, V_{GS} = 0V (Figure 12)	60	-	-	V
		I_D = 250µA, V_{GS} = 0V , T_C = -40°C (Figure 12)	55	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 55V, V_{GS} = 0V	-	-	1	µA
		V_{DS} = 50V, V_{GS} = 0V, T_C = 150°C	-	-	250	µA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±16V	-	-	±100	nA
ON STATE SPECIFICATIONS						
Gate to Source Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250µA (Figure 11)	1	-	3	V
Drain to Source On Resistance	$r_{DS(ON)}$	I_D = 20A, V_{GS} = 10V (Figures 9, 10)	-	0.027	0.032	Ω
		I_D = 20A, V_{GS} = 5V (Figure 9)	-	0.031	0.037	Ω
		I_D = 20A, V_{GS} = 4.5V (Figure 9)	-	0.033	0.040	Ω
THERMAL SPECIFICATIONS						
Thermal Resistance Junction to Case	$R_{\theta JC}$	TO-251 and TO-252	-	-	1.76	^{o}C/W
Thermal Resistance Junction to Ambient	$R_{\theta JA}$		-	-	100	^{o}C/W
SWITCHING SPECIFICATIONS (V_{GS} = 4.5V)						
Turn-On Time	t_{ON}	V_{DD} = 30V, I_D = 20A V_{GS} = 4.5V, R_{GS} = 10Ω (Figures 15, 21, 22)	-	-	240	ns
Turn-On Delay Time	$t_{d(ON)}$		-	12	-	ns
Rise Time	t_r		-	145	-	ns
Turn-Off Delay Time	$t_{d(OFF)}$		-	27	-	ns
Fall Time	t_f		-	50	-	ns
Turn-Off Time	t_{OFF}		-	-	120	ns
SWITCHING SPECIFICATIONS (V_{GS} = 10V)						
Turn-On Time	t_{ON}	V_{DD} = 30V, I_D = 20A V_{GS} = 10V, R_{GS} = 10Ω (Figures 16, 21, 22)	-	-	65	ns
Turn-On Delay Time	$t_{d(ON)}$		-	7	-	ns
Rise Time	t_r		-	35	-	ns
Turn-Off Delay Time	$t_{d(OFF)}$		-	52	-	ns
Fall Time	t_f		-	50	-	ns
Turn-Off Time	t_{OFF}		-	-	155	ns
GATE CHARGE SPECIFICATIONS						
Total Gate Charge	$Q_{g(TOT)}$	V_{GS} = 0V to 10V; V_{DD} = 30V, I_D = 20A, $I_{g(REF)}$ = 1.0mA (Figures 14, 19, 20)	-	28	34	nC
Gate Charge at 5V	$Q_{g(5)}$	V_{GS} = 0V to 5V	-	16	20	nC
Threshold Gate Charge	$Q_{g(TH)}$	V_{GS} = 0V to 1V	-	1.2	1.5	nC
Gate to Source Gate Charge	Q_{gs}		-	3.5	-	nC
Gate to Drain “Miller” Charge	Q_{gd}		-	7	-	nC
CAPACITANCE SPECIFICATIONS						
Input Capacitance	C_{ISS}	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz (Figure 13)	-	1060	-	pF
Output Capacitance	C_{OSS}		-	315	-	pF
Reverse Transfer Capacitance	C_{RSS}		-	65	-	pF

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage	V_{SD}	I_{SD} = 20A	-	-	1.25	V
		I_{SD} = 10A	-	-	1.0	V
Reverse Recovery Time	t_{rr}	I_{SD} = 20A, dI_{SD}/dt = 100A/µs	-	-	90	ns
Reverse Recovered Charge	Q_{RR}	I_{SD} = 20A, dI_{SD}/dt = 100A/µs	-	-	225	nC

Typical Performance Curves

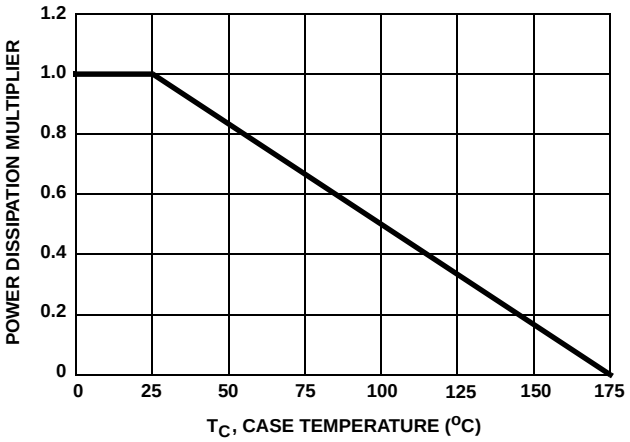


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

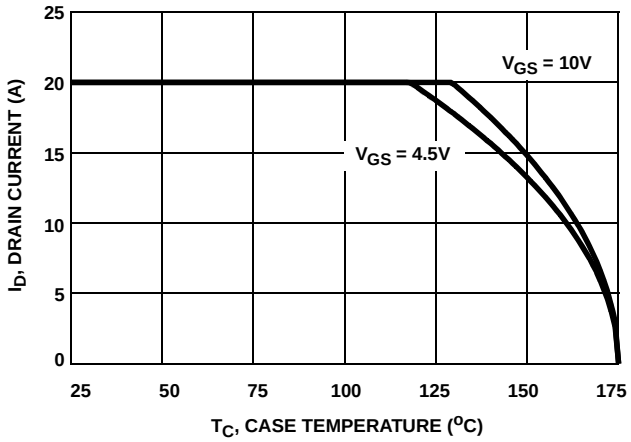


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

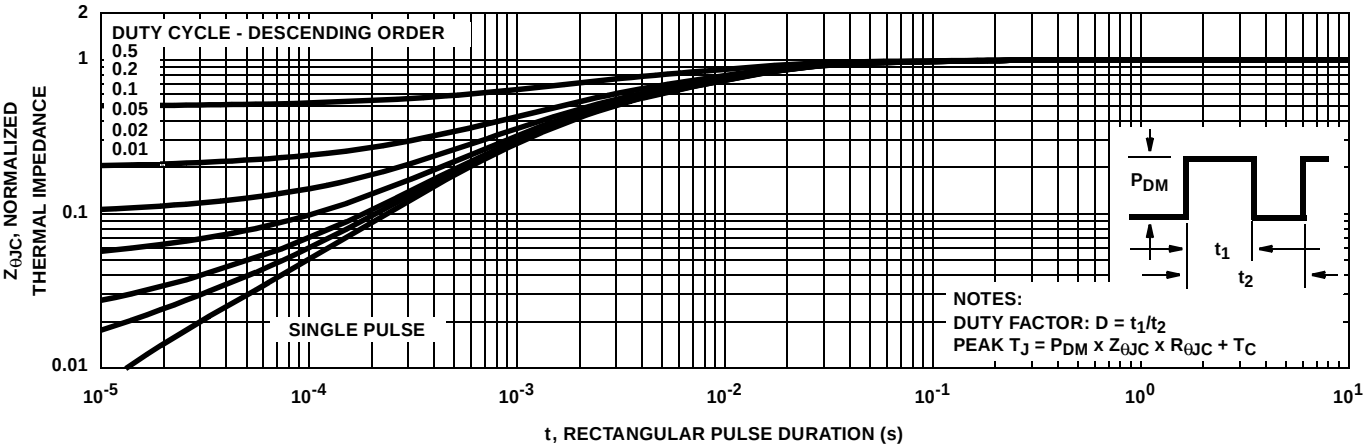


FIGURE 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

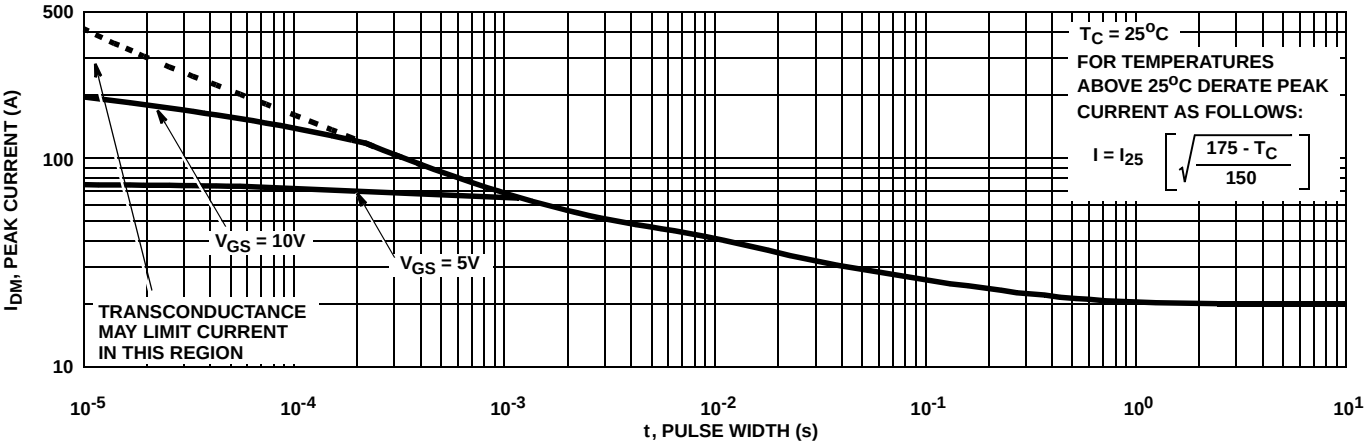


FIGURE 4. PEAK CURRENT CAPABILITY