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### FDME1034CZT

## Complementary PowerTrench<sup>®</sup> MOSFET N-channel: 20 V, 3.8 A, 66 m $\Omega$ P-channel: -20 V, -2.6 A, 142 m $\Omega$

### Features

#### Q1: N-Channel

- Max r<sub>DS(on)</sub> = 66 mΩ at V<sub>GS</sub> = 4.5 V, I<sub>D</sub> = 3.4 A
- Max  $r_{DS(on)}$  = 86 m $\Omega$  at V<sub>GS</sub> = 2.5 V, I<sub>D</sub> = 2.9 A
- Max  $r_{DS(on)} = 113 \text{ m}\Omega$  at  $V_{GS} = 1.8 \text{ V}$ ,  $I_D = 2.5 \text{ A}$
- Max r<sub>DS(on)</sub> = 160 mΩ at V<sub>GS</sub> = 1.5 V, I<sub>D</sub> = 2.1 A

Q2: P-Channel

- Max r<sub>DS(on)</sub> = 142 mΩ at V<sub>GS</sub> = -4.5 V, I<sub>D</sub> = -2.3 A
- Max  $r_{DS(on)}$  = 213 mΩ at V<sub>GS</sub> = -2.5 V, I<sub>D</sub> = -1.8 A Max  $r_{DS(on)}$  = 331 mΩ at V<sub>GS</sub> = -1.8 V, I<sub>D</sub> = -1.5 A
- Max  $r_{DS(on)}$  = 530 m $\Omega$  at V<sub>GS</sub> = -1.5 V, I<sub>D</sub> = -1.2 A
- Low profile: 0.55 mm maximum in the new package MicroFET 1.6x1.6 Thin
- Free from halogenated compounds and antimony oxides
- HBM ESD protection level > 1600 V (Note 3)
- RoHS Compliant

### **General Description**

This device is designed specifically as a single package solution for a DC/DC 'Switching' MOSFET in cellular handset and other ultra-portable applications. It features an independent N-Channel & P-Channel MOSFET with low on-state resistance for minimum conduction losses. The gate charge of each MOSFET is also minimized to allow high frequency switching directly from the controlling device.

The MicroFET 1.6x1.6 Thin package offers exceptional thermal performance for it's physical size and is well suited to switching and linear mode applications.

### Applications

- DC-DC Conversion
- Level Shifted Load Switch



MicroFET 1.6x1.6 Thin

MOSFET Maximum Ratings T<sub>A</sub> = 25 °C unless otherwise noted

Symbol	Paramet		Q1	Q2	Units			
V <sub>DS</sub>	Drain to Source Voltage			20	-20	V		
V <sub>GS</sub>	Gate to Source Voltage			±8	±8	V		
I <sub>D</sub>	Drain Current -Continuous	T <sub>A</sub> = 25 °C	(Note 1a)	3.8	-2.6	•		
	-Pulsed			6	-6	A		
P <sub>D</sub>	Power Dissipation for Single Operation $T_A = 25 \text{ °C}$ (Note 1a)		1.4		w			
	Power Dissipation for Single Operation $T_A = 25 \text{ °C}$ (Note 1b			(	).6	vv		
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range			-55 t	o +150	°C		

#### **Thermal Characteristics**

$R_{ ext{ heta}JA}$	Thermal Resistance, Junction to Ambient (Single Operation)	(Note 1a)	90	°C/W
$R_{ extsf{ heta}JA}$	Thermal Resistance, Junction to Ambient (Single Operation)	(Note 1b)	195	C/W

#### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
5T	FDME1034CZT	MicroFET 1.6x1.6 Thin	7 "	8 mm	5000 units

July 2010

Symbol	Parameter	Test Conditions	Туре	Min	Тур	Max	Units
Off Chara	cteristics						
BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	$I_{D} = 250 \ \mu\text{A}, \ V_{GS} = 0 \ V$ $I_{D} = -250 \ \mu\text{A}, \ V_{GS} = 0 \ V$	Q1 Q2	20 -20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \ \mu$ A, referenced to 25 °C $I_D = -250 \ \mu$ A, referenced to 25 °C	Q1 Q2		16 -12		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	$V_{DS} = 16 V, V_{GS} = 0 V$ $V_{DS} = -16 V, V_{GS} = 0 V$	Q1 Q2			1 -1	μΑ
I <sub>GSS</sub>	Gate to Source Leakage Current	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$	All			±10	μΑ
On Chara	cteristics						
V <sub>GS(th)</sub>	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \ \mu A$ $V_{GS} = V_{DS}, I_D = -250 \ \mu A$	Q1 Q2	0.4 -0.4	0.7 -0.6	1.0 -1.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \ \mu$ A, referenced to 25 °C	Q1 Q2		-3 2		mV/°C
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 3.4 A			55	66	- mΩ
		$V_{GS} = 2.5 \text{ V}, \ \text{I}_{D} = 2.9 \text{ A}$			68	86	
		$V_{GS} = 1.8 \text{ V}, I_D = 2.5 \text{ A}$	Q1		85	113	
	Drain to Source On Resistance	$V_{GS} = 1.5 \text{ V}, I_D = 2.1 \text{ A}$			106	160	
r <sub>DS(on)</sub>		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 3.4 A, T <sub>J</sub> =125°C			76	112	
		$V_{GS} = -4.5 \text{ V}, I_D = -2.3 \text{ A}$			95	142	
		$V_{GS} = -2.5 \text{ V}, I_D = -1.8 \text{ A}$			120	213	
		$V_{GS} = -1.8 \text{ V}, I_D = -1.5 \text{ A}$	Q2		150	331	
		$\begin{split} V_{GS} &= -1.5 \text{ V}, \ I_D &= -1.2 \text{ A} \\ V_{GS} &= -4.5 \text{ V}, \ I_D &= -2.3 \text{ A}, \\ T_J &= 125 \text{ °C} \end{split}$			190 128	530 190	
9fs	Forward Transconductance	$V_{DS} = 4.5 V, I_D = 3.4 A$ $V_{DS} = -4.5 V, I_D = -2.3 A$	Q1 Q2		9 7		S
Dvnamic	Characteristics						
C <sub>iss</sub>	Input Capacitance		Q1		225	300	pF
		Q1 V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	Q2 Q1		305 40	405 55	
C <sub>oss</sub>	Output Capacitance	Q2	Q2		55	75	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	V <sub>DS</sub> = -10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	Q1 Q2		25 50	40 75	pF
Switching	Characteristics	· · · · · · · · · · · · · · · · · · ·				1	-1
t <sub>d(on)</sub>	Turn-On Delay Time	~	Q1 Q2		4.5 4.7	10 10	
t <sub>r</sub>	Rise Time	Q1 $V_{DD} = 10 \text{ V}, \text{ I}_{D} = 1 \text{ A},$	Q1 Q2		2.0 4.8	10 10 10	ns
t <sub>d(off)</sub>	Turn-Off Delay Time	$V_{GS} = 4.5 V, R_{GEN} = 6 \Omega$ Q2 $V_{DD} = -10 V, I_D = -1 A,$	Q1 Q2		15 33	27 53	- 115
t <sub>f</sub>	Fall Time	$V_{GS} = -4.5 \text{ V}, \text{ R}_{GEN} = 6 \Omega$	Q1 Q2		1.7 16	10 29	
Qg	Total Gate Charge	Q1	Q1 Q2		3 5.5	4.2 7.7	
Q <sub>gs</sub>	Gate to Source Gate Charge	$V_{DD} = 10 \text{ V}, \ \text{I}_{D} = 3.4 \text{ A}, \ V_{GS} = 4.5 \text{ V}$ Q2	Q2 Q1 Q2		0.4 0.6	1.1	nC
Q <sub>gd</sub>	Gate to Drain "Miller" Charge	$V_{DD} = -10 \text{ V}, \text{ I}_{D} = -2.3 \text{ A}, V_{GS} = -4.5 \text{ V}$	Q2 Q1		0.6		-

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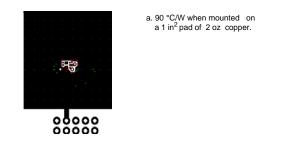
Symbol	Parameter	Test Conditions	Туре	Min	Тур	Max	Units
Drain-So	urce Diode Characteristics						
V <sub>SD</sub>	Source to Drain Diode Forward Voltage	$ \begin{array}{ll} V_{GS} = 0 \ V, \ I_S = 0.9 \ A & (Note \ 2) \\ V_{GS} = 0 \ V, \ I_S = -0.9 \ A & (Note \ 2) \end{array} $	Q1 Q2		0.7 -0.8	1.2 -1.2	V
t <sub>rr</sub>	Reverse Recovery Time	Q1 I <sub>F</sub> = 3.4 A, di/dt = 100 A/µS	Q1 Q2		8.5 16	17 29	ns
Q <sub>rr</sub>	Reverse Recovery Time	Q2 I <sub>F</sub> = -2.3 A, di/dt = 100 A/µs	Q1 Q2		1.4 4.4	10 10	nC

Notes: 1. R<sub>0,D4</sub> is determined with the device mounted on a 1 in<sup>2</sup> pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. R<sub>0,JC</sub> is guaranteed by design while R<sub>0CA</sub> is determined by the user's board design.

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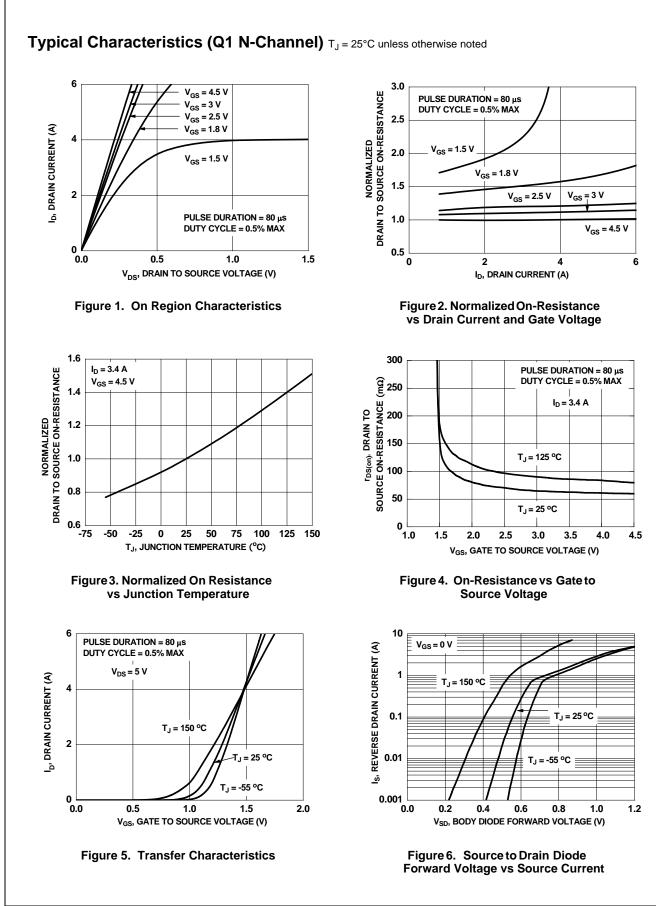
b. 195 °C/W when mounted on a minimum pad of 2 oz copper.

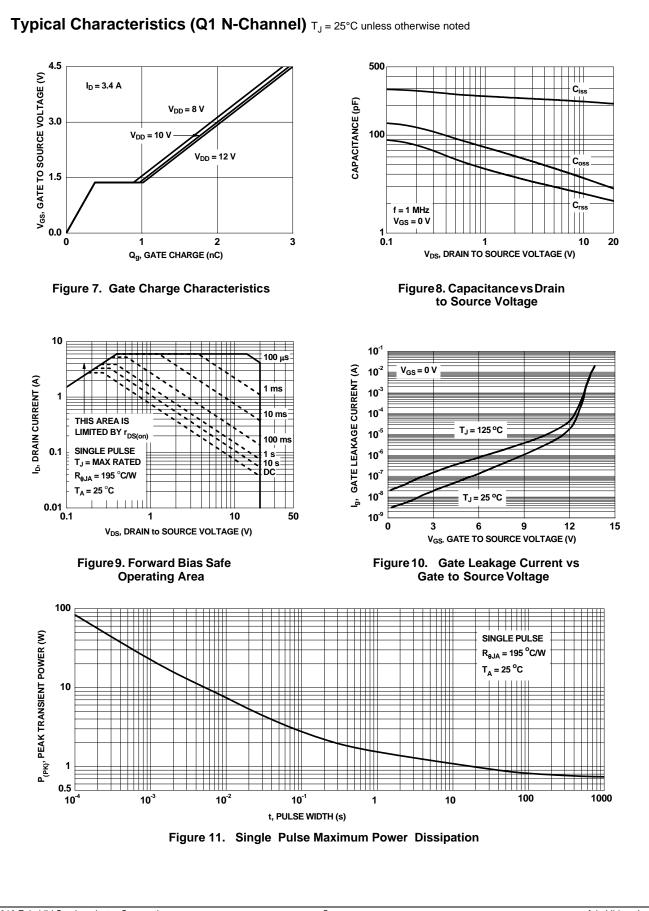


2. Pulse Test: Pulse Width < 300  $\mu s,$  Duty cycle < 2.0%.

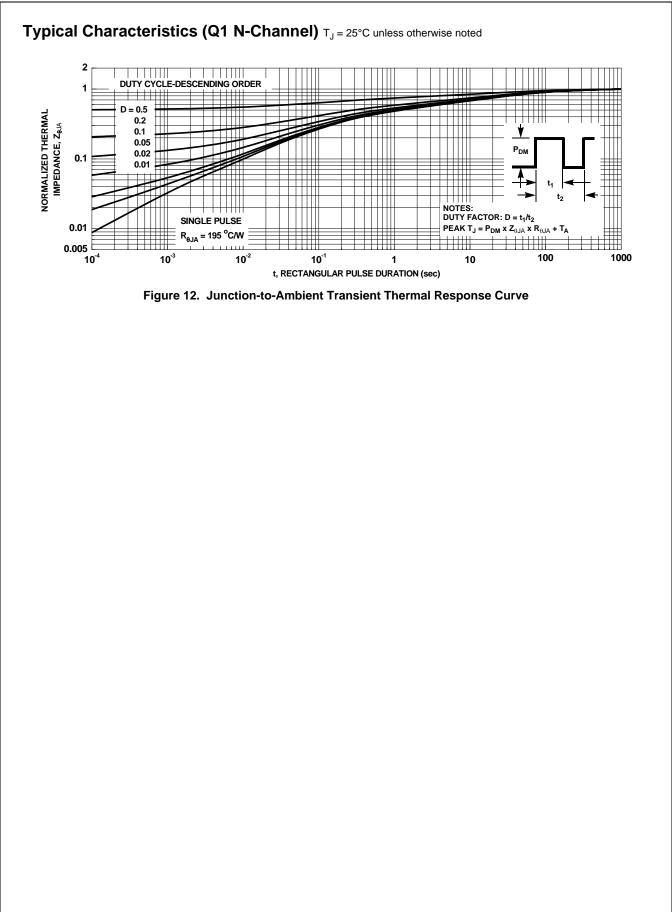
3. The diode connected between the gate and source serves only as protection ESD. No gate overvoltage rating is implied.



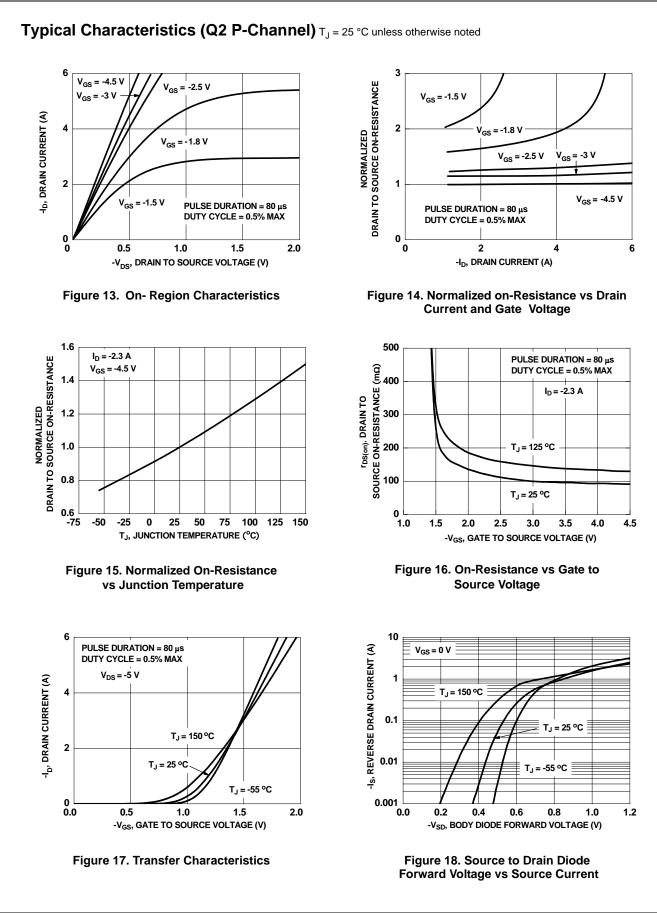


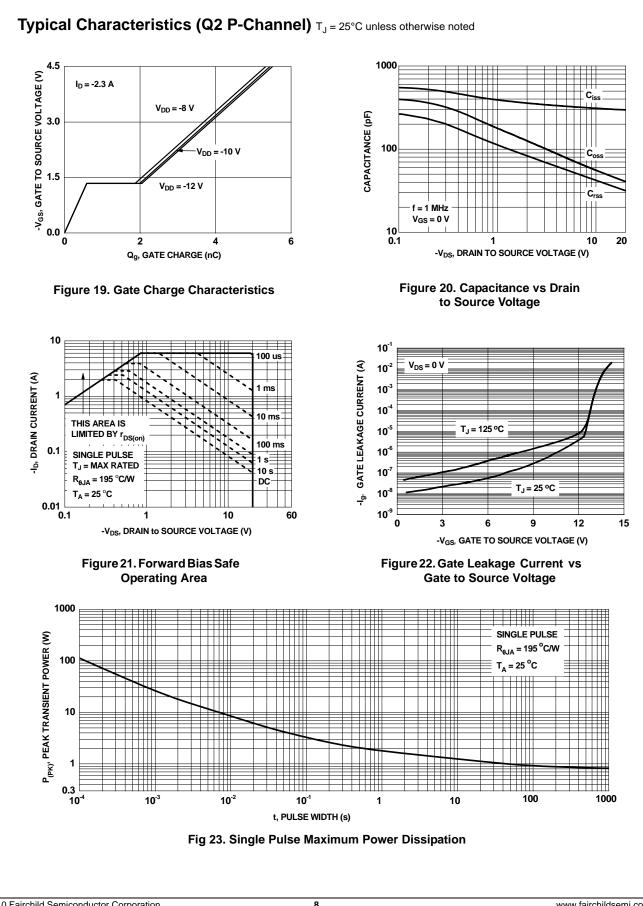


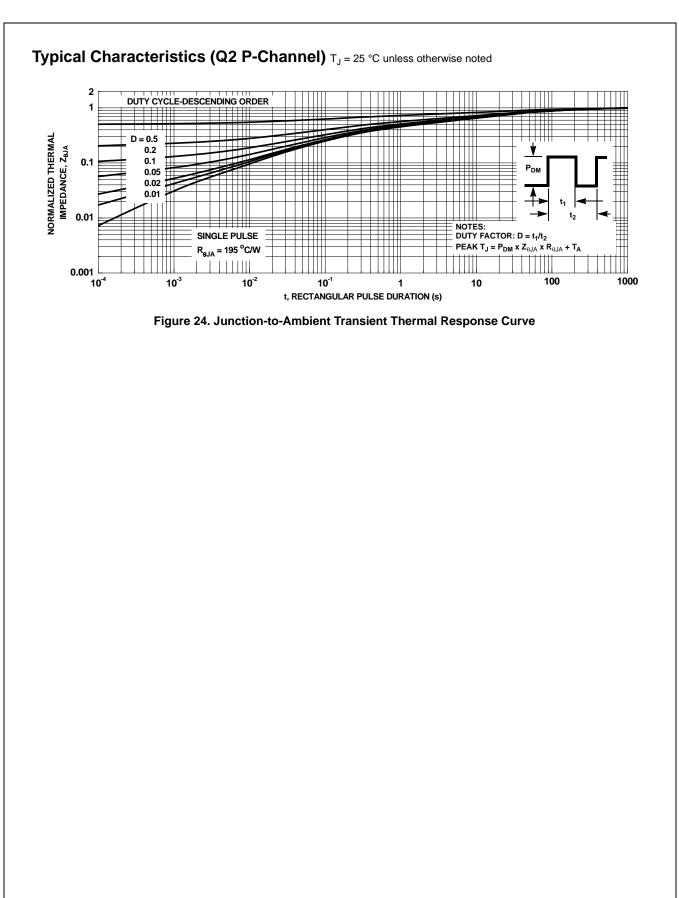
FDME1034CZT Complementary PowerTrench<sup>®</sup> MOSFET

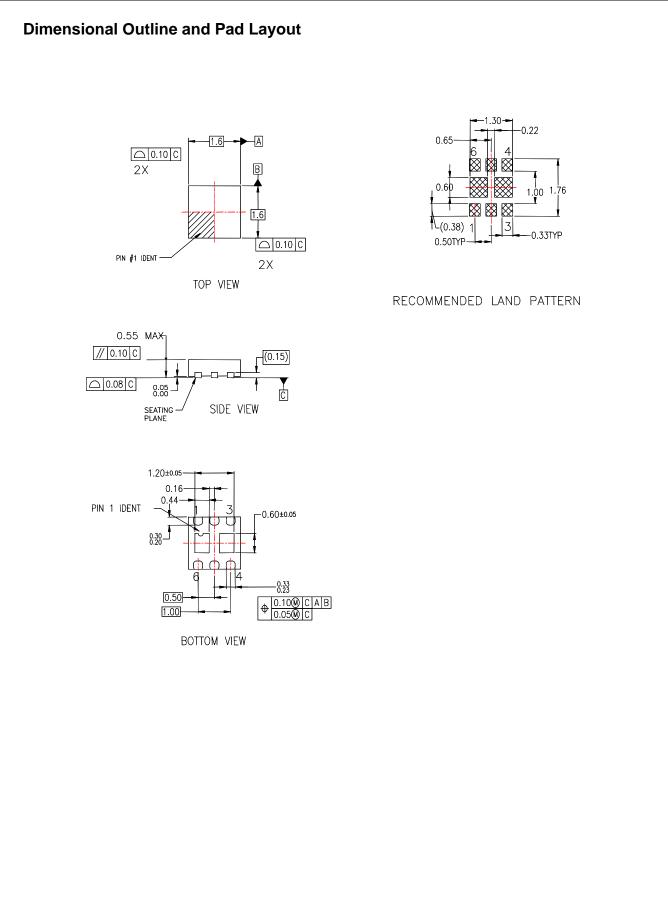


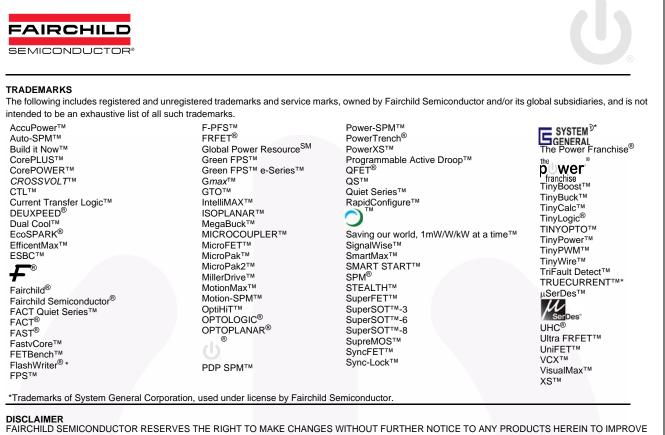
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