

富士电机第五代IGBT模块U-系列(U4-系列改良版)

Fuji 5th Gen. IGBT Module U-series (Improved Version U4-Series)

●设计理念 Concept of the development

U4-IGBT模块的改良,“易于使用”

- 更低的功率耗散损失
- 易于并联
- 更低的电磁噪声

Development of the U4-IGBT Module for 'Easy to use'

- Lower power dissipation loss
- Easy to connect in parallel
- Lower radiation noise

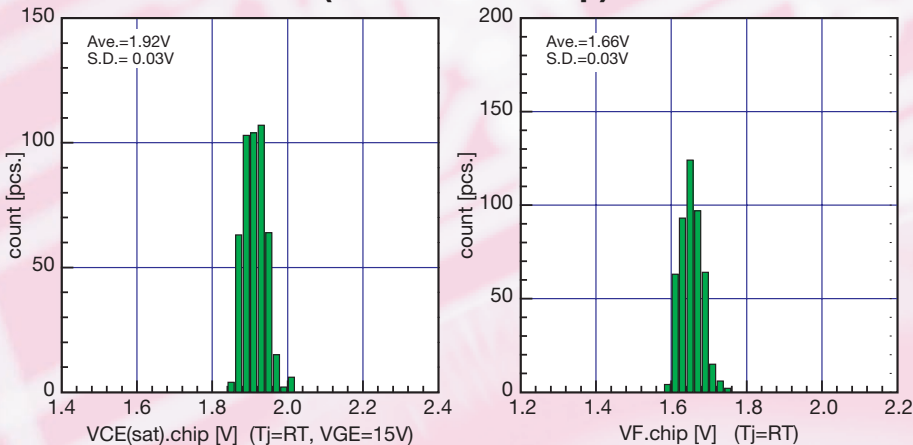
●U-系列与U4-系列的特性比较

Comparison of characteristics between U and U4-series

		U	U4
PKG.		conventional U package	same as U-series
Chip size	IGBT	U-chip size	same as U-series
	FWD	U-chip size	same as U-series
Chip structure	IGBT	FS-Trench	new structure based on U-chip
	FWD	Epi-FWD	FZ-FWD
VCE(sat) @125C [V]		2.0	2.1
VF @125C [V]		1.7	1.75
VF distribution		distribution of about 0.5V	narrower distribution ($\leq 0.3V$)
Eon @125C		U-series characteristic	lower loss (30% reduction)
Eoff @125C		U-series characteristic	same as U-series
Err @125C		U-series characteristic	same as U-series
Radiation noise		U-series characteristic	lower noise (5~10dB reduction)

●Von分配 (1200V/150A芯片)

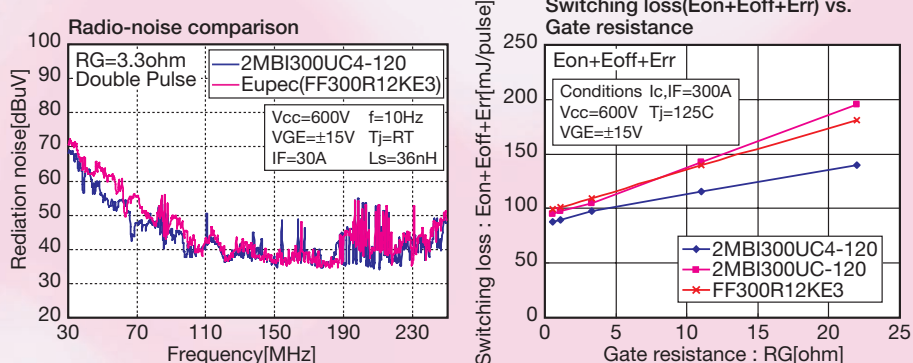
Von distribution (1200V/150A chip)



●1200V/300A M234电磁噪声评估<直流斩波器:正常模式>

1200V/300A M234 radio-noise evaluation <DC-chopper: Normal mode>

	Repetitive double pulse				Unit
	1.1ohm	3.3ohm	10ohm	22ohm	
2MBI300UC-120	75.42	74.90	71.97	70.12	dBuV
2MBI300U4C-120	75.87	69.05	62.10	61.60	
FF300R12KE3	78.92	72.40	65.20	61.42	

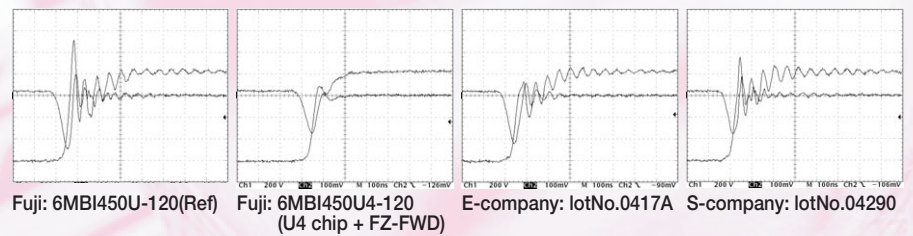


●特性 Features

- 低损耗:与标准U系列相比,导通切换的损耗降低30%以上。而截止切换的损耗以及FWD逆向恢复损耗与标准U系列相同
- FZ-FWD可变频率分配范围更小。VCE(sat)与VF的分配小于0.3V,令并联更简便。
- FZ-FWD的快速软逆向恢复。
- 门电阻更易于控制导通切换速度。
- 通过组合使用U4-IGBT和FZ-FWD使切换操作过程中的电磁噪声更低。
- 包装与传统U系列兼容。
- Low-loss: More than 30% reduction of turn-on switching loss compared to standard U-series. Turn-off switching loss and reverse recovery loss of FWD are same as standard U-series.
- Narrower VF distribution by FZ-FWD. Less than 0.3V of distribution for both VCE(sat) and VF makes parallel connection easier.
- Soft and fast reverse recovery by FZ-FWD.
- Turn-on switching speed is more controllable by gate resistor.
- Lower radiation noise during switching operation could be achieved by combination of U4-IGBT and FZ-FWD.
- Package compatibility with conventional U-series.

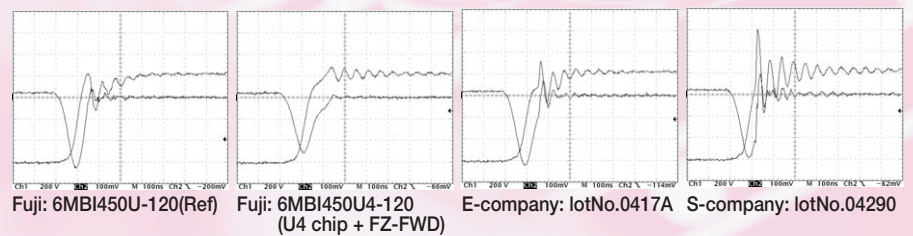
●Tj=RT时的逆向恢复波形(IF=10A, RG=3.3ohm)

Reverse Recovery Wave-form (IF=10A, RG=3.3ohm) at Tj=RT



●Tj=125°C时的逆向恢复波形(IF=10A, RG=3.3ohm)

Reverse Recovery Wave-form (IF=10A, RG=3.3ohm) at Tj=125 deg.C



●产品系列

Products Line-up

		Ic rating												
		50A (11kW)	75A	100A (22kW)	150A	225A (40kW)	200A	300A (45kW)	400A (75kW)	600A	800A	1200A	1600A	2400A
1200V	PIM	6in1	New PC2 with NTC		New PC3 with NTC		EconoPack-Plus (6in1)							
		2in1	M232 M233		M235		M249 M248							
		1in1	M127 M138		M142		M143							
		1700V	6in1	New PC3 with NTC		EconoPack-Plus (6in1)								
1700V	PIM	2in1	M249		M248									
		1in1	M142		M143									