

Power Mosfet 5th Generation

The Performance Revolution

HITACHI

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Power Mosfet 5th Generation - The Performance Revolution

1.1 RDS (ON) 4.5m Ohm - A new standard has been set

With the introduction of the new D5-Series HITACHI started a new age of RDS (ON) performance. Using 1.3 μ m technology and more than double of the cell density in comparison to the previous D4-Series HITACHI reached a 50% RDS (ON) reduction. With this technology HITACHI can offer a 0.0045 Ohm device in TO-3P or a 0.007 Ohm device in TO220 a value which seemed out of reach only one year ago. With the new D5-Series HITACHI offers better device performance at lower cost.

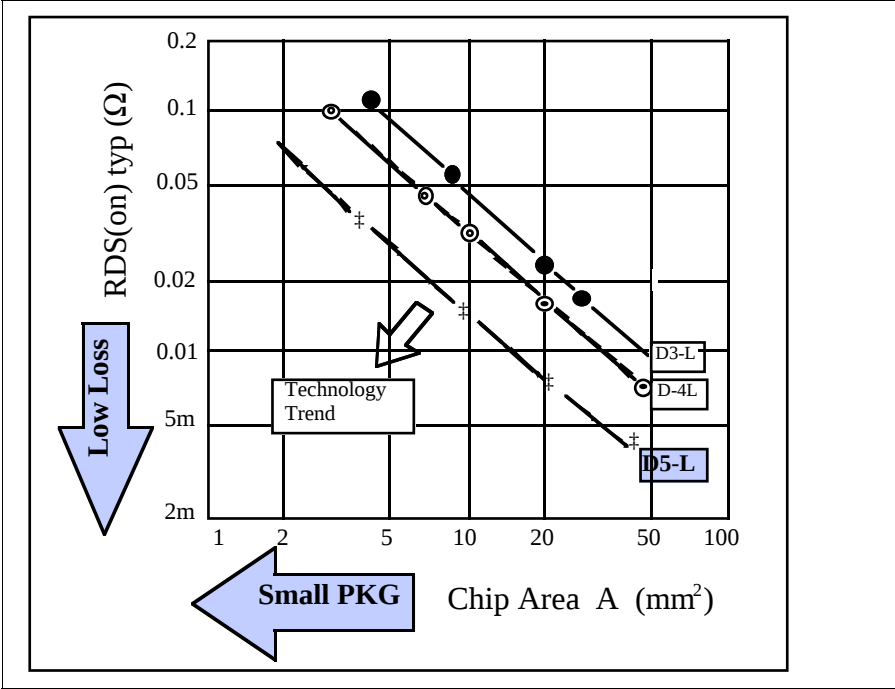


Figure 1.1 RDS (ON) versus chip area

1.2. 2.5V Drive - HITACHI Contribution to Battery Applications

More and more battery powered equipment is using intelligent power management which switches on and off internal and external circuits to extend the stand-by time. This switching is done by a Power MOSFET which has to have a extreme low RDS (ON) already at the 3.3V logic level of the μ -processor.

HITACHI offers a complete line-up with low voltage optimised 2.5V gate drive N- and P-channel devices in different packages. The HAT1023R, one of HITACHI's P-channel SOP-8 line-up, achieves an on resistance of 0.027 Ohm (typ), which corresponds to the highest performance level in the electronics industry for a P-channel Power Mosfet with 20V breakdown voltage and 2.5V gate drive.

1.3 Avalanche Capability - Clear Commitment to Ruggedness

Power Mosfets can be destroyed by the surge voltage generated from the load inductance and from parasitic inductance. HITACHI's guaranteed values for repetitive avalanche energy level and its temperature characteristic belong to the highest world-wide.

1.4 Package - New Degree of Freedom

From TO-3P down to the 2.8mm MPAK HITACHI can offer a broad line-up with drain currents from 0.3A to 75A. In the middle of 1997 HITACHI introduced the new TSSOP-8 package to meet the advanced market requirements of much smaller footprint and higher density. In that package HITACHI offers also Dual-N, Dual-P and mixed N/P channel devices.

Table 1.1 SOP-8 Product Line-up

Part Name	Maximum Rates		Electrical Characteristics					
	V _{DSS} (V)	I _D (A)	R _{DS} (ON)Ω @10V		R _{DS} (ON) Ω @4V		R _{DS} (ON Ω @2.5V	
			Typ	Max	Typ	Max	Typ	Max
HAT2020R (Nch/X1)	30	8	0.020	0.028	0.030	0.050	-	-
HAT2022R (Nch/X1)	30	11	0.012	0.015	0.017	0.025	-	-
HAT2019R (Nch/X1) #	30	8			0.020	0.027	0.027	0.037
HAT2016R (Nch/X2)	30	6.5	0.030	0.045	0.050	0.080	-	-
HAT2027R (Nch/X2) #	20	7			0.030	0.038	0.038	0.053
HAT1020R (Pch/X1)	-30	-5	0.040	0.070	0.070	0.130	-	-
HAT1023R (Pch/X1)	-20	7	-	-	0.027	0.040	0.040	0.060
HAT1021R (Pch/X1) #	-20	-5.5	-	-	0.048	0.060	0.065	0.085
HAT1026R (Pch/X1) #	-30	-7	0.022	0.037	0.040	0.065	-	-
HAT1024R (Pch/X2)	-30	-2.5	0.012	0.016	0.20	0.034	-	-
HAT1025R (Pch/X2)	-20	- 4.5	-	-	0.065	0.095	0.090	0.150
HAT3004R (Nch/PchX1) #	30	3.5	0.08	0.10	0.11	0.15	-	-
	-30	-2.5	0.13	0.20	0.20	0.40		
HAT3006R (Nch/Pch) #	30	6	0.03	0.045	0.05	0.08	-	-
	-30	- 4	0.08	0.110	0.12	0.18		
HAT1029R (Pch/X2)	-20	-3.5	-	-	0.10	0.14	0.16	0.23
HAT1016R (Pch/X2)	-30	-4.5	0.07	0.09	0.11	0.18	-	-
HAT2026R (Nch/X1)	20	11	-	-	0.011	0.015	0.014	0.021
HAT2025R (Nch/X1)	30	8	0.019	0.026	0.030	0.050	-	-
HAT2029R (Nch/X2)	28	7.5	-	-	0.025	0.033	0.031	0.043
HAT2024R (Nch/X2)	30	5.5	0.050	0.065	0.078	0.11	-	-
HAT2028R (Nch/X2)	60	4	0.08	0.10	0.12	0.16	-	-

Table 1.2 TSSOP-8 Product Line-up

Part Name	Maximum Rates		Electrical Characteristics					
			R _{DS} (ON)Ω @10V		R _{DS} (ON) Ω @4V		R _{DS} (ON) Ω @2.5V	
	V _{DSS} (V)	I _D (A)	Typ	Max	Typ	Max	Typ	Max
HAT1030T (Pch/X2)	-12	-3	-	-	0.085	0.10	0.12	0.18
HAT1031T (Pch/X2)	-20	- 2.5	-	-	0.095	0.12	0.14	0.20
HAT1032T (Pch/X1)	-12	- 4	-	-	0.05	0.06	0.07	0.10
HAT1033T (Pch/X1)	-20	- 3.5	-	-	0.06	0.75	0.85	0.13
HAT2031T (Pch/X2)	20	3.5	-	-	0.045	0.060	0.050	0.080
HAT2037T (Pch/X1)	28	4.5	-	-	0.025	0.033	0.031	0.043

Table 1.3 D5-Line-up by Package at low voltage type

Partname	Max. Rating		Electrical Characteristics				PKG
			R _{DS} (ON)Ω @4V		R _{DS} (ON)Ω @2.5V		
	V _{DSS} (V)	I _D (A)	Typ	Max	Typ	Max	
2SJ486	-30	-0.3	0.5	0.65	0.7	1.2	MPAK
2SK2802	30	-0.3	0.2	0.28	0.3	0.5	MPAK

Table 1.4 D5-Line-up by Package of logic level components

Partname	Max. Rating		Electrical Characteristics				PKG
			R _{DS} (ON)Ω @10V		R _{DS} (ON)Ω @4V		
	V _{DSS} (V)	I _D (A)	Typ	Max	Typ	Max	
2SJ484	-30	-2	0.18	0.23	0.3	0.45	UPAK
2SK2788*	60	2	0.12	0.16	0.16	0.25	UPAK
2SK2735	30	20	0.020	0.028	0.030	0.050	DPAK
2SK2796*	60	5	0.12	0.18	0.17	0.26	DPAK
2SK2925*	60	10	0.070	0.10	0.10	0.16	DPAK
2SK2926*	60	15	0.055	0.070	0.080	0.130	DPAK
2SK2869*	60	20	0.033	0.045	0.055	0.070	DPAK
2SJ479	-30	-30	0.030	0.040	0.040	0.055	LDBAK
2SJ505*	-60	-50	0.016	0.022	0.025	0.038	LDBAK
2SK2553	60	50	0.007	0.010	0.010	0.016	LDBAK
2SK2684	30	30	0.020	0.028	0.030	0.050	LDBAK
2SK2885	30	45	0.010	0.014	0.015	0.025	LDBAK
2SK2957	30	50	0.007	0.010	0.010	0.015	LDBAK
2SK2958	30	75	0.005	0.007	0.008	0.012	LDBAK
2SK2938*	60	25	0.026	0.034	0.045	0.070	LDBAK
2SK2939*	60	35	0.020	0.026	0.032	0.050	LDBAK
2SK2912*	60	40	0.015	0.020	0.025	0.040	LDBAK
2SK2940*	60	45	0.011	0.014	0.015	0.025	LDBAK
2SJ483	-30	-5	0.080	0.110	0.120	0.170	TO-92M
2SJ496*	-60	-5	0.120	0.160	0.170	0.240	TO-92M
2SK2734	30	5	0.040	0.055	0.055	0.080	TO-92M
2SK2851	60	5	0.055	0.070	0.070	0.10	TO-92M
2SJ471	-30	-30	0.030	0.040	0.040	0.055	TO-220CFM
2SK2736	30	30	0.020	0.028	0.030	0.050	TO-220CFM
2SK2737	30	45	0.010	0.014	0.015	0.025	TO-220CFM
2SK2956	30	50	0.007	0.010	0.010	0.015	TO-220CFM
2SK2932*	60	10	0.070	0.10	0.10	0.160	TO-220CFM
2SK2933*	60	15	0.042	0.055	0.065	0.011	TO-220CFM
2SK2934*	60	25	0.026	0.034	0.045	0.070	TO-220CFM
2SK2935*	60	35	0.020	0.026	0.032	0.050	TO-220CFM

Partname	Max. Rating		Electrical Characteristics				PKG
			R _{DS} (ON)Ω @10V		R _{DS} (ON)Ω @4V		
	V _{DSS} (V)	I _D (A)	Typ	Max	Typ	Max	
2SK2936*	60	45	0.011	0.014	0.015	0.025	TO-220CFM
2SK2738*	60	40	0.015	0.020	0.025	0.040	TO-220CFM
2SK2529*	60	50	0.007	0.010	0.010	0.016	TO-220CFM
2SK2927*	60	10	0.070	0.10	0.10	0.16	TO-220 B
2SK2928*	60	15	0.042	0.055	0.065	0.11	TO-220 B
2SK2929*	60	25	0.026	0.034	0.045	0.070	TO-220 B
2SK2930*	60	35	0.020	0.026	0.032	0.050	TO-220 B
2SK2931*	60	45	0.011	0.014	0.015	0.025	TO-220 B
2SK2800	60	40	0.015	0.020	0.025	0.040	TO-220AB
2SK2801	60	50	0.007	0.010	0.010	0.016	TO-220AB
2SK2586*	60	60	0.007	0.010	0.010	0.016	TO-3P
2SK2955*	60	50	0.011	0.014	0.015	0.025	TO-3P
2SK2554	60	75	0.0045	0.006	0.0058	0.010	TO-3P

* Avalanche guarantee