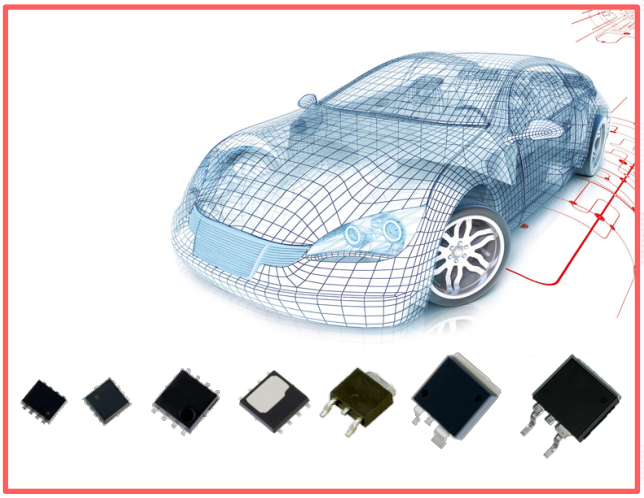
TOSHIBA
Leading Innovation

GLYN
High-Tech Distribution

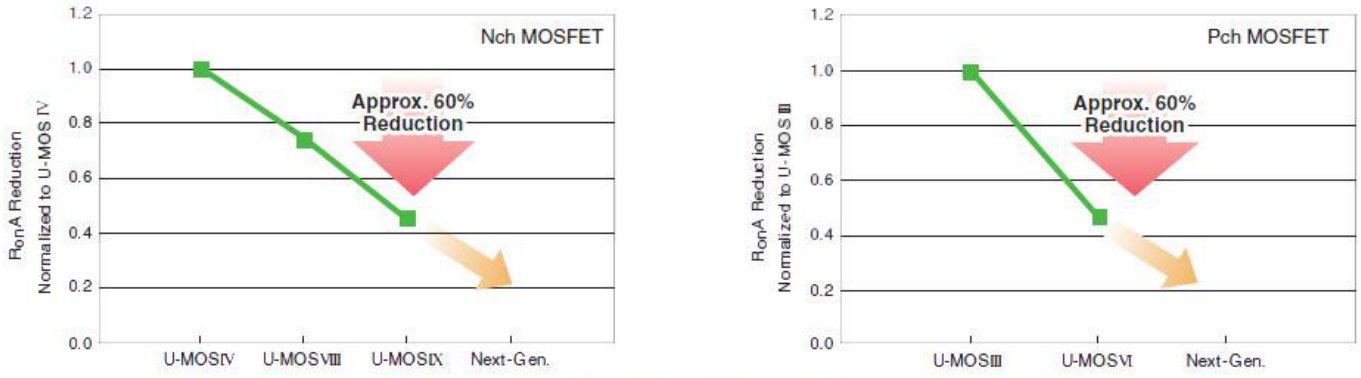
MOSFET

POWER MOSFETS
FOR AUTOMOTIVE

Toshiba offers an extensive line up of power MOSFETs for various automotive applications including 48V battery systems. The combination of low ON-resistance and advanced package technology makes Toshiba's power MOSFETs an ideal solution for reducing system losses, thereby contributing to energy-saving in automotive applications.



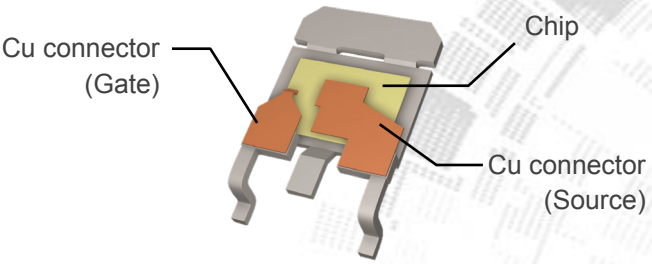
REDUCED RonA DUE TO THE SMALL-GEOMETRY TRENCH PROCESS



RonA Reduction Trend (V_{DSS} = 40 V)

COPPER (Cu) CONNECT PACKAGE BONDING

The DPAK+, D2PAK+ and TO-220SM(W) series provide a current drive capability approx. twice that of their predecessors due to the use of a Cu connector structure.



TO-220SM(W) PACKAGE (10mm X 13mm)

Package	Polarity	Process	V_{DSS} (V)	Part No.	R_{DS}(ON) max (mΩ)		I_D(DC) (A)	P_D (W)	Qg typ (nC)	Ciss typ (pF)
					V_{GS}=10V (-10V Pch)	V_{GS}=6V (-6V Pch)				
	Nch	UMOS9	40	TKR74F04PB	0.74	0.98	250	375	227	14200
				TK1R4F04PB	1.35	1.90	160	205	103	5500
		UMOS8	40	TK200F04N1L	0.9	1.37	200	375	214	14920
			80	S1CJ1*	(2.0)	(3.0)	(180)	(375)	(153)	(11000)
			100	S1LP8*	(6.11)	(9.25)	(60)	(205)	(60)	(4320)
				TK160F10N1L	2.4	3.9	160	375	122	10100
	Pch	UMOS6	-40	TJ200F04M3L	1.8	2.6	-200	375	460	12800
				TJ100F04M3L	3.6	5.4	-100	250	250	9500
			-60	TJ150F06M3L	5.6	6.1	-150	300	420	12500
				TJ100F06M3L	7.1	10.7	-100	250	250	9000

* Under development

D2PAK+ PACKAGE (10mm X 15mm)

Package	Polarity	Process	V_{DSS} (V)	Part No.	R_{DS}(ON) max (mΩ)		I_D(DC) (A)	P_D (W)	Qg typ (nC)	Ciss typ (pF)
					V_{GS}=10V	V_{GS}=6V				
	Nch	UMOS9	40	TK1R5R04PB	1.50	2.05	160	205	103	5500
		UMOS8	100	S1KV2*	(6.31)	(9.55)	(60)	(205)	(60)	(4320)

* Under development

DPAK+ PACKAGE (6.5mm X 9.5mm)

Package	Polarity	Process	V_{DSS} (V)	Part No.	R_{DS}(ON) max (mΩ)		I_D(DC) (A)	P_D (W)	Qg typ (nC)	Ciss typ (pF)
					V_{GS}=10V (-10V Pch)	V_{GS}=4.5V/6V (-4.5V/-6V Pch)				
	Nch	UMOS9	40	TK1R4S04PB	1.35	1.90@6V	120	180	103	5500
		UMOS8	40	TK100S04N1L	2.3	4.5@4.5V	100	157	76	5490
				TK65S04N1L	4.3	7.8@4.5V	65	107	39	2550
				TK15S04N1L	17.8	37@4.5V	15	46	10	610
			60	TK90S06N1L	3.3	5.2@4.5V	90	157	81	5400
				TK40S06N1L	10.5	18@4.5V	40	88	26	1650
				TK25S06N1L	18.5	36.8@4.5V	25	57	15	855
			100	S1KT4*	(6.11)	(9.25@6V)	(60)	(180)	(60)	(4320)
				TK55S10N1	6.5	-	55	157	49	3280
				TK33S10N1Z	9.7	-	33	125	28	2050
				TK33S10N1L	9.7	16.2@4.5V	33	125	33	2250
				TK11S10N1L	28	50@4.5V	11	65	15	850
				TK7S10N1Z	48	-	7	50	7.1	470
	Pch	UMOS6	-40	S1LR1*	(4.3)	(6.45@-4.5V)	(-90)	(180)	(172)	(7700)
				TJ80S04M3L	5.2	7.9@-6V	-80	100	158	7770
				TJ60S04M3L	6.3	9.4@-6V	-60	90	125	6510
				TJ40S04M3L	9.1	13@-6V	-40	68	83	4140
				TJ20S04M3L	22.2	32@-6V	-20	41	37	1850
				TJ10S04M3L	44	62@-6V	-10	27	19	930
			-60	TJ60S06M3L	11.2	14.5@-6V	-60	100	156	7760
				TJ50S06M3L	13.8	17.4@-6V	-50	90	124	6290
				TJ30S06M3L	21.8	28@-6V	-30	68	80	3950
				TJ15S06M3L	50	63@-6V	-15	41	36	1770
				TJ8S06M3L	104	130@-6V	-8	27	19	890

* Under development

DSOP ADVANCE PACKAGE (5mm X 6mm)

Package	Polarity	Process	V_{DSS} (V)	Part No.	R_{DS}(ON) max (mΩ)		I_D(DC) (A)	P_D (W)	Qg typ (nC)	Ciss typ (pF)
					V_{GS}=10V	V_{GS}=6V				
	Nch	UMOS9	40	S1GX6*	(0.79)	(1.3)	(150)	(170)	(85)	(6340)
				S1LA0*	(1.14)	(1.96)	(120)	(132)	(55)	(4560)
		UMOS8		S1HX7*	(2.2)	(3.5)	(50)	(132)	(67)	(4850)

* Under development

SOP ADVANCE PACKAGE (5mm X 6mm)

Package	Polarity	Process	V_{DSS} (V)	Part No.	R_{DS}(ON) max (mΩ)		I_D(DC) (A)	P_D (W)	Qg typ (nC)	Ciss typ (pF)
					V_{GS}=10V (-10V Pch)	V_{GS}=4.5V/6V (-6V Pch)				
	Nch	UMOS9	40	S1HR5*	(0.79)	(1.3@6V)	(150)	(170)	(85)	(6340)
				S1GX4*	(1.14)	(1.96@6V)	(120)	(132)	(55)	(4560)
	Pch	UMOS6	-40	TPCA8122	5	7.2@-6V	-60	84	152	7340
				TPCA8124	10.5	14.6@-6V	-35	55	77	3750
			-60	TPCA8123	11.1	14.9@-6V	-50	84	163	7000
				TPCA8125	25.5	34.4@-6V	-25	55	78	3650

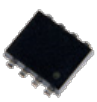
* Under development

TSON ADVANCE PACKAGE (3.3mm X 3.3mm)

Package	Polarity	Process	V_{DSS} (V)	Part No.	R_{DS}(ON) max (mΩ)		I_D(DC) (A)	P_D (W)	Qg typ (nC)	Ciss typ (pF)
					V_{GS}=10V (-10V Pch)	V_{GS}=4.5V/6V (-6V Pch)				
	Nch	UMOS8	40	S1JR4*	(7.1)	(14.2@4.5V)	(20)	(46.8)	(21)	(1290)
		UMOS4	40	TPCC8069	8.1	14.1@6V	30	46.8	34	1640
			60	TPCC8070	13.5	21.3@6V	30	46.8	34	1600
	Pch	UMOS6	-40	TPCC8106	12.3	18.9@-6V	-30	46.8	66	3100
			-60	TPCC8107	30.5	42.9@-6V	-25	46.8	63	2930

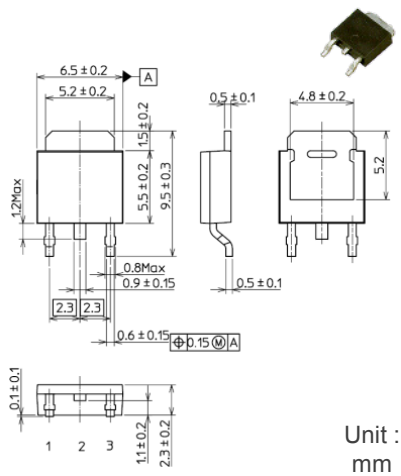
* Under development

PS-8 PACKAGE (2.8mm X 2.9mm)

Package	Polarity	Process	V_{DSS} (V)	Part No.	R_{DS}(ON) max (mΩ)		I_D(DC) (A)	P_D (W)	Qg typ (nC)	Ciss typ (pF)
					V_{GS}=10V (-10V Pch)	V_{GS}=6V (-6V Pch)				
	Nch Single	UMOS4	40	TPCP8009	11.8	19.5	10	2.01	25.1	1250
				TPCP8010	23.8	38.4	6	1.96	13.1	600
				TPCP8011	31.8	51.2	5	1.96	11.8	505
			60	TPCP8012	20.2	29.1	8	2.01	26.6	1160
				TPCP8013	51.8	77.9	4	1.96	12	515
	Pch Single	UMOS6	-40	TPCP8107	18	26.8	-8	2.01	44.6	2160
				TPCP8109	52.3	76.8	-4.5	1.96	18	810
			-60	TPCP8110	39.5	53.2	-5	2.01	45	2075
				TPCP8111	117	158.4	-3	1.96	17	760
	Nch Dual	UMOS4	40	TPCP8207	36.3	62.3	5	1.77	11.8	505
	Nch + Pch	UMOS4 +UMOS6	40/-40	TPCP8407	36.3/56.8	62.8/82.2	5/-4	1.96	11.8/18	505/810

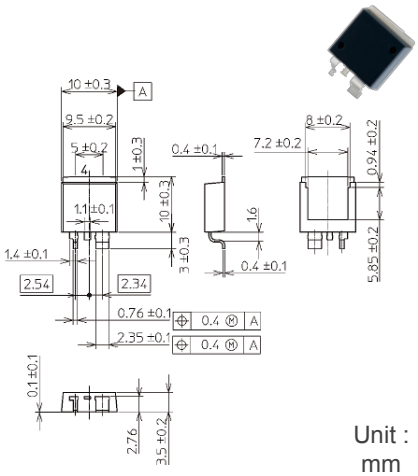
POWER MOSFET PACKAGE LINE-UP

DPAK+



Unit : mm

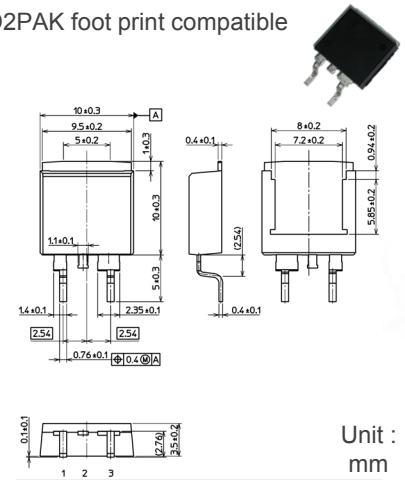
TO-220SM(W)



Unit : mm

D2PAK+

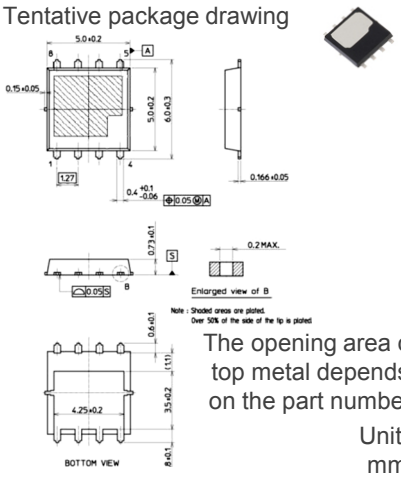
D2PAK foot print compatible



Unit : mm

DSOP Advance

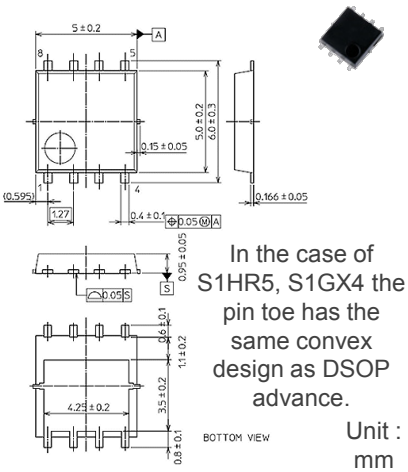
Tentative package drawing



The opening area of top metal depends on the part number

Unit : mm

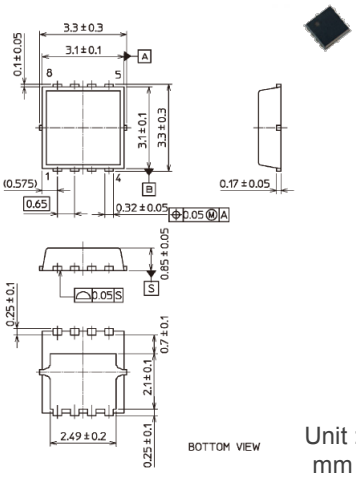
SOP Advance



In the case of S1HR5, S1GX4 the pin toe has the same convex design as DSOP advance.

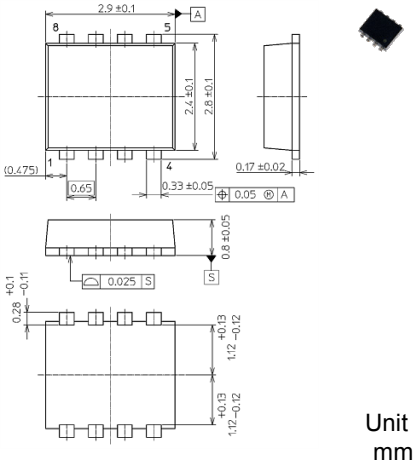
Unit : mm

TSON Advance



Unit : mm

PS-8



Unit : mm

DUAL SIDE COOLING

Using the new DSOP dual-side cooling package gives the same footprint as the SOP-Adv. Due to the strongly reduced thermal resistance, the maximum load can be increased considerably. Alternatively the MOSFET temperature can be reduced to increase long term reliability.