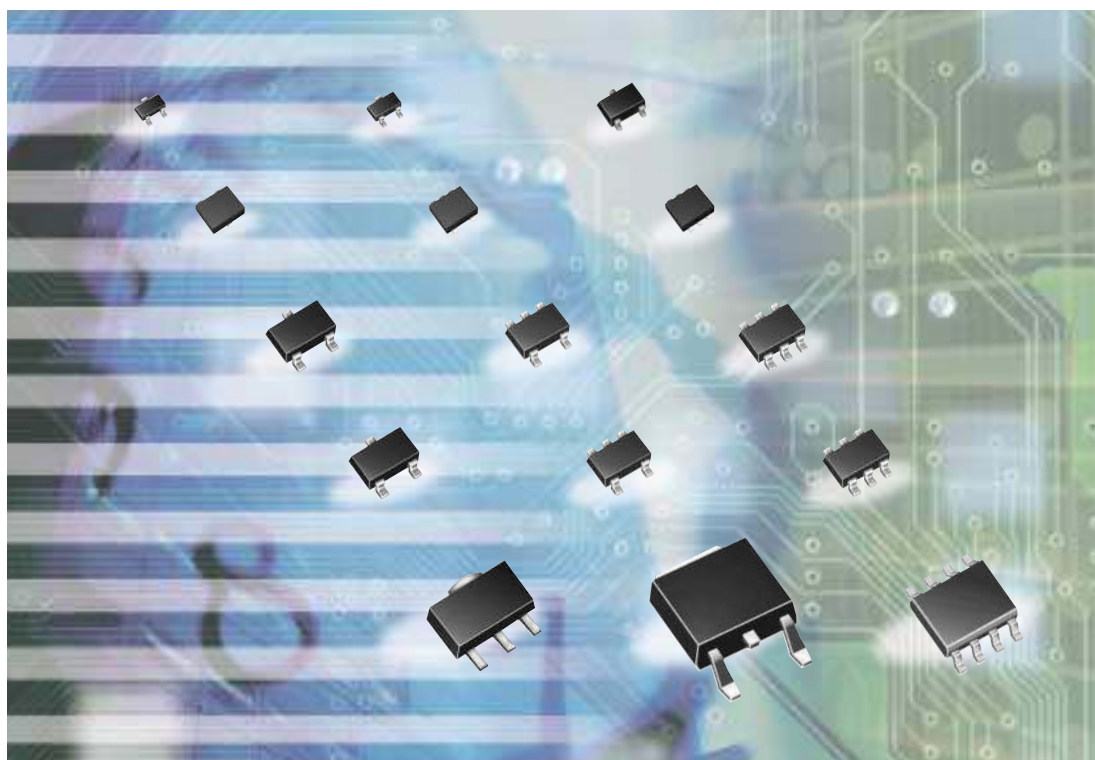


# Transistor New Products



## CONTENTS

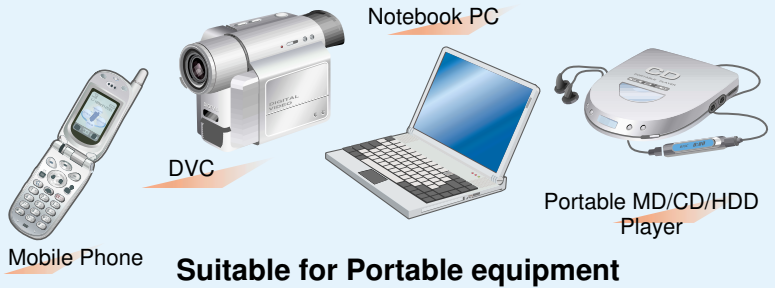
- **MOS FET Series**
- **Low  $V_{CE(sat)}$  Miniature Digital Transistor Series**
- **Low  $V_{CE(sat)}$  Transistor Series**
- **Endured Discharge Voltage/  
High Speed Switching/  
Low Noise Transistor Series**
- **Muting Transistor Series**

# MOS FET

## TUMT/TSMT Series



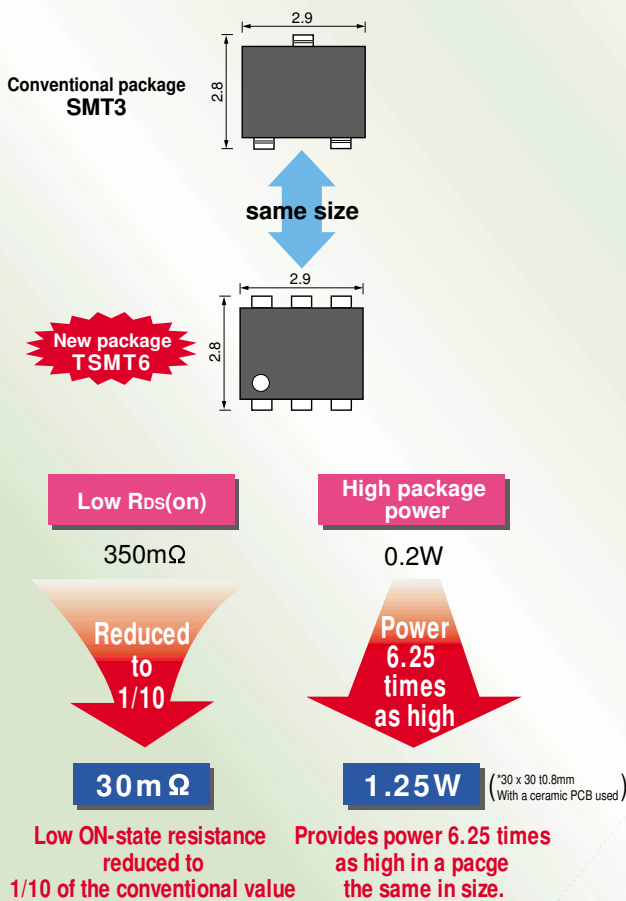
### Application



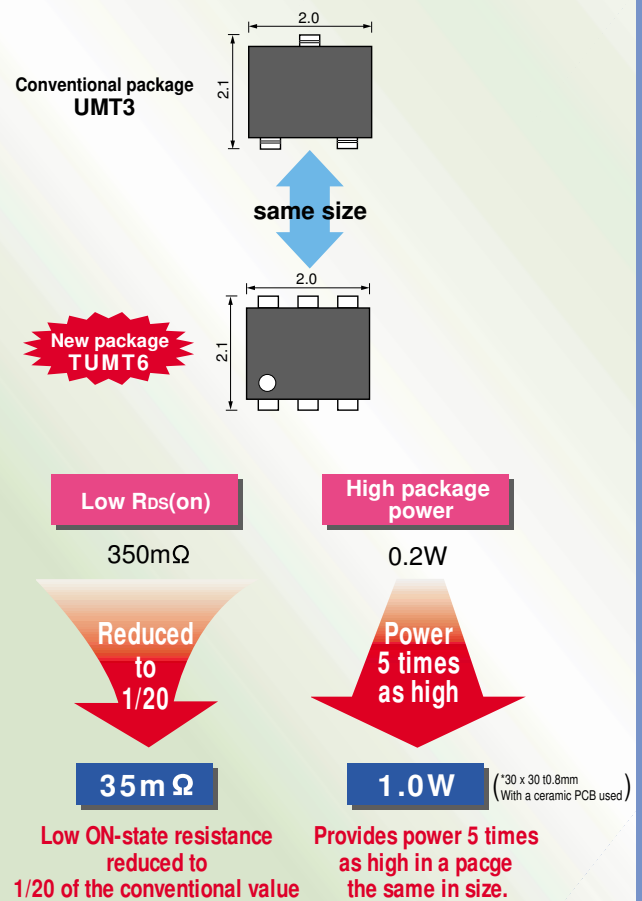
### Features

- Realizes low ON-state resistance with even compact packages.
- Offers a line-up of compound products combining two elements with the downsizing of the packages attained, thus contributing to the high-density mounting of the packages.
- Offers a line-up of easy-to-use compound products with Schottky Barrier Diode for power supply applications.

#### ● TSMT



#### ● TUMT



# TUMT•TSMT Series

Drive Voltage:4V

Note) Internal circuit:P.9

## Nch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (mΩ) *1		Q <sub>g</sub> *2 (nC)	Circuit
					Typ.	Max.		
TUMT3	RSF014N03	Single	30	1.4	170	230	1.4	Fig. 2
TUMT6	US6K2	Dual						Fig. 5
TSMT6	RSQ035N03	Single		3.5	44	62	5.3	Fig. 1
	RSQ045N03			4.5	27	38	6.8	

\*1:V<sub>GS</sub>=10V \*2:V<sub>GS</sub>=5V

## Pch

Package	Part No.	Type	V <sub>bss</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (mΩ) *1		Q <sub>g</sub> *2 (nC)	Circuit
					Typ.	Max.		
TUMT3	RSF010P03	Single	30	1	260	350	1.9	Fig.10
TSMT3	RSR015P03			1.5	170	235	2.6	
	RSR020P03			2	85	120	4.3	
	RSR025P03				70	98	5.4	
TSMT6	RSQ025P03			2.5	80	110	4.9	Fig. 9
	RSQ030P03			3	60	80	6	
	RSQ035P03			3.5	45	65	9	

\*1:V<sub>GS</sub>=10V \*2:V<sub>GS</sub>=5V

## Nch+SBD

Package	Part No.	Type	V <sub>bss</sub> (V) V <sub>R</sub> (V)	I <sub>D</sub> (A) I <sub>O</sub> (A)	R <sub>DS(on)</sub> (mΩ) / V <sub>F</sub> (V)		Q <sub>g</sub> (nC)	Circuit
					Typ.	Max.		
TUMT5	US5U1	MOS	30	1.5	170	240	1.6	Fig. 8
		SBD	20	0.5	—	0.36	—	
	US5U2	MOS	30	1.4	170	240	1.4	
		SBD	20	0.5	—	0.36	—	

## Pch+SBD

Package	Part No.	Type	V <sub>bss</sub> (V) V <sub>R</sub> (V)	I <sub>D</sub> (A) I <sub>O</sub> (A)	R <sub>DS(on)</sub> (mΩ) / V <sub>F</sub> (V)		Q <sub>g</sub> (nC)	Circuit
					Typ.	Max.		
TSMT6	QS6U24	MOS	30	1	300	400	1.7	Fig. 15
		SBD	20	0.7	—	0.49	—	

## Pch+Nch

Package	Part No.	Type	V <sub>bss</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (mΩ) *1		Q <sub>g</sub> *2 (nC)	Circuit
					Typ.	Max.		
TUMT6	US6M1	Nch	30	1.4	170	240	1.4	Fig. 16
		Pch	20	1	280	390	2.1	

\*1:V<sub>GS</sub>=10V \*2:V<sub>GS</sub>=5V

# MOS FET

## TUMT•TSMT Series

Drive Voltage:2.5V Note) Internal circuit:P.9

### Nch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>Ds(on)</sub> (mΩ) <sup>*1</sup>		Q <sub>g</sub> <sup>*2</sup> (nC)	Circuit
					Typ.	Max.		
TUMT3	RTF015N03	Single	30	1.5	170	240	1.6	Fig. 2
	RTF025N03			2.5	48	67	3.7	
TUMT6	RTL035N03			3.5	35	56	4.6	Fig. 1
TUMT5	US5K3	Dual		1.5	170	240	1.6	Fig. 4
TUMT6	US6K1						Fig. 5	
TSMT3	RTR025N03	Single		2.5	66	92	3.3	Fig. 2
	RTR040N03			4	34	48	5.9	
TSMT6	RTQ020N03			Single	2	89	125	2.4
	RTQ035N03	3.5			38	54	5	
	RTQ045N03	4.5			30	43	7.6	
	QS6K1	Dual		1	170	238	1.7	Fig. 3
TSMT5	QS5K2				71	100	2.8	Fig. 4

\*1:V<sub>GS</sub>=4.5V \*2:V<sub>GS</sub>=4.5V

### Pch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>Ds(on)</sub> (mΩ) <sup>*1</sup>		Q <sub>g</sub> <sup>*2</sup> (nC)	Circuit		
					Typ.	Max.				
TUMT3	RTF010P02	Single	20	1	280	390	2.1	Fig. 10		
	1.1			2						
	RTF015P02			1.5	100	135	5.2			
	RTF020P02			2	60	85	7			
RTL020P02	100	135			4.9	Fig. 9				
TUMT6	RTL030P02	3		50	70		8			
	US6J2	Dual		1	280	390	2.1	Fig. 12		
TSMT3	RTR020P02	Single		2	100	135	4.9	Fig. 10		
	RTR025P02			2.5	70	95	7			
	TSMT6			RTR030P02	3	55	75		9.3	Fig. 9
				RTQ025P02	2.5	72	100		7.0	
TSMT6	RTQ030P02	Single		3	60	80	9.3	Fig. 9		
	RTQ035P02			3.5	50	65	10.5			
	RTQ040P02			4	35	50	12.5			
	QS6J1			Dual	1.5	155	215		3	Fig. 11
	QS6J3	Fig. 12								

\*1:V<sub>GS</sub>=4.5V \*2:V<sub>GS</sub>=4.5V

### Nch+SBD

Package	Part No.	Type	V <sub>DSS</sub> (V) V <sub>R</sub> (V)	I <sub>D</sub> (A) I <sub>O</sub> (A)	R <sub>DS(on)</sub> (mΩ) / V <sub>F</sub> (V) *1		Q <sub>g</sub> *2 (nC)	Circuit
					Typ.	Max.		
TUMT5	US5U3	MOS	30	1.5	170	240	1.6	Fig. 8
		SBD	20	0.7	—	0.49	—	
TSMT5	QS5U12	MOS	30	2	71	100	2.8	Fig. 7
		SBD	20	1	—	0.45	—	
	QS5U13	MOS	30	2	71	100	2.8	
		SBD	20	0.5	—	0.36	—	
	QS5U16	MOS	30	2	71	100	2.8	Fig. 8
		SBD	20	0.5	—	0.36	—	
	QS5U17	MOS	30	2	71	100	2.8	
		SBD	20	1	—	0.45	—	

\*1:V<sub>GS</sub>=4.5V \*2:V<sub>GS</sub>=4.5V

# TUMT•TSMT Series

Drive Voltage:2.5V Note) Internal circuit:P.9

## Pch+SBD

Package	Part No.	Type	V <sub>DSS</sub> (V) V <sub>R</sub> (V)	I <sub>D</sub> (A) I <sub>0</sub> (A)	R <sub>DS(on)</sub> (mΩ) / V <sub>F</sub> (V) *1		Q <sub>g</sub> *2 (nC)	Circuit
					Typ.	Max.		
TUMT5	US5U29	MOS	20	1	280	390	2.1	Fig. 14
		SBD		0.7	—	0.49	—	
	US5U30	MOS		1	280	390	2.1	
		SBD		0.5	—	0.36	—	
TSMT5	QS5U21	MOS		1.5	160	200	4.5	Fig. 13
		SBD		1	—	0.45	—	
	QS5U23	MOS		1.5	160	200	4.5	
		SBD		0.5	—	0.36	—	
	QS5U26	MOS		1.5	160	200	4.5	Fig. 14
		SBD		0.5	—	0.45	—	
	QS5U27	MOS		1.5	160	200	4.5	
		SBD		1	—	0.45	—	
	QS5U28	MOS		2	90	125	5	
		SBD		1	—	0.45	—	
TSMT6	QS6U22	MOS		1.5	155	215	3	Fig. 15
		SBD		0.7	—	0.49	—	

\*1:V<sub>GS</sub>=4.5V \*2:V<sub>GS</sub>=4.5V

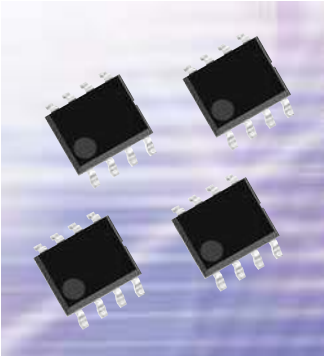
## Pch+Nch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (mΩ) *1		Q <sub>g</sub> *2 (nC)	Circuit
					Typ.	Max.		
TUMT6	US6M2	Nch	30	1.5	170	240	1.6	Fig. 16
		Pch	20	1	280	390	2.1	
TSMT6	QS6M3	Nch	30	1.5	170	230	1.7	Fig. 17
		Pch	20		155	215	3	
	QS6M4	Nch	30		170	230	1.7	Fig. 16
		Pch	20		155	215	3	
		Pch	20		155	215	3	

\*1:V<sub>GS</sub>=4.5V \*2:V<sub>GS</sub>=4.5V

# MOS FET

## SOP8



Features

Low  $R_{DS(on)}$

Low power consumption

Low  $Q_g$

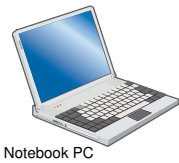
Fast switching speed

High ESD capability

Failure reduction

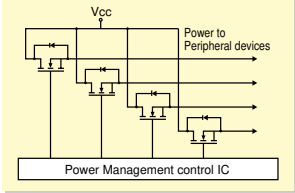
Dense mounting

Two elements in one package

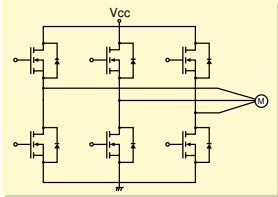


Ideal for DC/DC converter and power management SW.  
Meets the key needs of MOSFET in power supply DC/DC converter.

Example of application circuit



Power Management Circuit



Motor Drive Circuit

Drive Voltage:4V      Note) Internal circuit:P.10

### Nch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (mΩ) <sup>*1</sup>		Q <sub>g</sub> <sup>*2</sup> (nC)	Circuit
					Typ.	Max.		
SOP8	RSS065N03	Single	30	6.5	19	27	6.1	Fig. 18
	RSS090N03			9	11	16	11	
	RSS100N03			10	9.5	13.3	14	
	RSS105N03			10.5	8.5	11.9	15	
	RSS110N03			11	7.6	10.7	17	
	RSS120N03			12	7.1	10	18	
	RSS125N03			12.5	6.5	9.1	20	
	RSS130N03			13	5.9	8.3	25	
	RSS140N03			14	4.9	6.9	37	
	SP8K5	Dual		3.5	59	83	2.5	Fig. 19
	SP8K1			5	36	51	3.9	
	SP8K2			6	21	30	7.2	
	SP8K3			7	17	24	8.4	
	SP8K4			9	12	17	15	

\*1:V<sub>GS</sub>=10V   \*2:V<sub>GS</sub>=5V

### Pch

Package	Part No.	Type	V <sub>BSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (mΩ) <sup>*1</sup>		Q <sub>g</sub> <sup>*2</sup> (nC)	Circuit
					Typ.	Max.		
SOP8	RSS040P03	Single	30	4	42	58	8.0	Fig. 20
	RSS050P03			5	30	42	13	
	RSS075P03			7.5	15	21	30	
	RSS090P03			9	10	14	39	
	SP8J4	Dual		2	170	235	2.4	Fig. 21
	SP8J3			3.5	65	90	5.5	
	SP8J2			4.5	40	56	8.5	
	SP8J1			5	30	42	16	
	SP8J5			7	20	28	25	

\*1:V<sub>GS</sub>=10V   \*2:V<sub>GS</sub>=5V

## Other Packages

Drive Voltage:2.5V Note) Internal circuit:P.9

### Nch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (Ω) *3		Circuit
					Typ.	Max.	
VMT3	2SK3541	Single	30	0.1	5	8	Fig. 2
EMT3	2SK3019						
UMT3	2SK3018						
	RJU003N03			0.3	0.9	1.3	
SMT3	RJK005N03			0.5	0.43	—	
MPT3	2SK3065		60	2	0.25	0.32	Fig. 6
	RJP020N06			2.5	0.16	0.24	
EMT6	EM6K1	Dual	30	0.1	5	8	Fig. 5
UMT6	UM6K1N						
SMT6	SM6K4			0.3	0.9	1.3	

\*3:V<sub>GS</sub>=4V

### Pch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (Ω) *3		Circuit
					Typ.	Max.	
VMT3	RTM002P02	Single	30	0.2	1.1	1.6	Fig. 2
EMT3	RTE002P02						
UMT3	RTU002P02						

\*3:V<sub>GS</sub>=4V

Drive Voltage:4V Note) Internal circuit:P.9

### Nch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (Ω) *1		Circuit
					Typ.	Max.	
UMT3	RHU003N03	Single	30	0.3	0.75	1.2	Fig. 2
	RHU002N06		60	0.2	1.6	2.4	
SST3	RK7002			0.115	2.2	7.5	
	RK7002A		30	0.3	0.7	1.0	
SMT3	RHK005N03			0.5	0.34	0.55	
	RHK002N06		60	0.2	1.7	—	
	RHK003N06			0.3	0.7	1.0	
MPT3	RHP030N03		30	0.2	0.09	0.12	Fig. 6
	RHP020N06		60		0.15	0.20	
SMT6	SM6K2	Dual	60	0.2	1.6	—	Fig. 5

\*1:V<sub>GS</sub>=10V

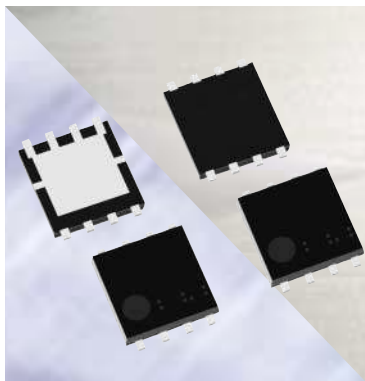
### Pch

Package	Part No.	Type	V <sub>DSS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(on)</sub> (Ω) *1		Circuit
					Typ.	Max.	
VMT3	RSM002P03	Single	30	0.2	0.9	1.4	Fig. 2
EMT3	RSE002P03						
UMT3	RSU002P03						

\*1:V<sub>GS</sub>=10V

# MOS FET

## PSOP8·PSOP8S

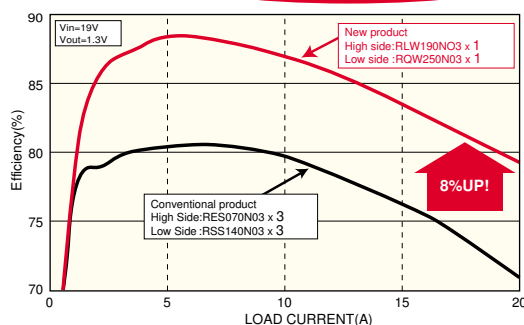


### Features 1

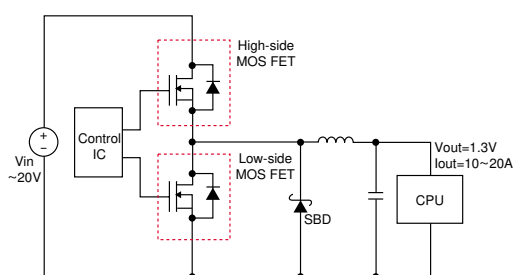
- Realizes great power supply efficiency with our new technology (i.e., a 8% increase compared to conventional models) → Ideal for CPU cores
- Incorporates a high-speed optimized switch on the high side and a low ON resistance on the low side

#### Power Supply Efficiency Evaluation

Single PSOP8 realizes same efficiency rate as two SOP8 in parallel connection



#### DC-DC converter(CPU Core)Circuit Diagram



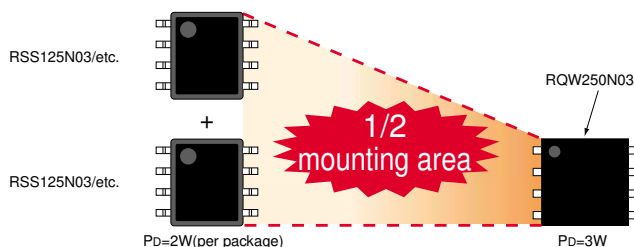
### Features 2

- Single PSOP8 package replacing two SOP8 packages

The single PSOP8 package has excellent heat dissipation (with a PD 1.5 times as high as that of SOP8 packages), that allows the replacement of conventional two SOP8 packages in parallel connection

SOP8 x 2

PSOP8 x 1



**Nch** Note) Internal circuit:P.10

#### ● For Low Side

Package	Part No.	Type	Vbss (V)	Id (A)	Rds(on) (mΩ) <sup>*1</sup>		Qgd <sup>*2</sup> (nC)	Circuit
					Typ.	Max.		
PSOP8	RQW160N03	Single	30	16	5.5	7.7	4.1	Fig. 18
	RQW180N03			18	4.1	5.4	5.4	
	RQW200N03			20	3.0	3.9	7.5	
	RQW250N03			25	1.8	2.5	11.2	
PSOP8S	RQA160N03	Single	30	16	5.5	7.7	4.1	
	RQA180N03			18	4.1	5.4	5.4	
	RQA200N03			20	3.0	3.9	7.5	

#### ● For High Side

Package	Part No.	Type	Vbss (V)	Id (A)	Rds(on) (mΩ) <sup>*1</sup>		Qgd <sup>*2</sup> (nC)	Circuit
					Typ.	Max.		
PSOP8	RLW130N03	Single	30	13	9.5	13.3	3.4	Fig. 18
	RLW140N03			14	8.7	12.2	3.6	
	RLW190N03			19	4.4	6.2	6.8	
PSOP8S	RLA130N03	Single	30	13	9.5	13.3	3.4	
	RLA140N03			14	8.7	12.2	3.6	

\*1:Vgs=10V \*2:Vgs=5V

\*1:Vgs=10V \*2:Vgs=5V

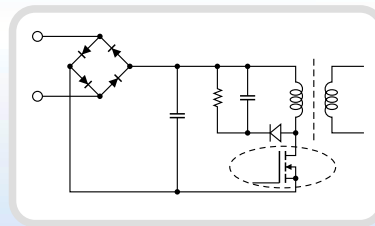


## Power Transistors



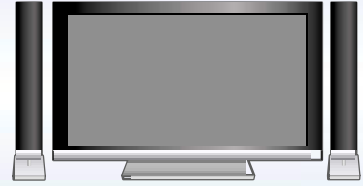
### Features

- Realizes low  $R_{DS(on)}$  by optimized design pattern.
- Built-in gate protection diode
- Avalanche capability ratings



### Application

- PDP, Power Supply



## Nch

Package	Part No.	$V_{DS}$ (V)	$I_D$ (A)	$R_{DS(on)}$ ( $\Omega$ ) *1	
				Typ.	Max.
CPT3	2SK2887	200	3	0.7	0.9
	RDD050N20		5	0.55	0.72
	2SK2715	500	2	3	4
	2SK3050	600	2	4.4	5.5
D2PAK	RDJ150N20	200	15	0.12	0.16
	RDJ080N25	250	8	0.38	0.5
	RDJ120N25		12	0.16	0.21
TO-220FN	RDN050N20	200	5	0.55	0.72
	RDN100N20		10	0.27	0.36
	RDN150N20		15	0.12	0.16
	RDN080N25	250	8	0.38	0.5
	RDN120N25		12	0.16	0.21
TO-220FM	RDX300N15	150	30	0.032	0.044
	RDX280N20	200	28	0.048	0.062
	RDX250N23	230	25	0.06	0.076
	RDX220N25	250	22	0.075	0.097
	RDX080N40	400	8	0.6	0.8
	RDX120N40		12	0.35	0.46
	RDX060N45	450	6	0.65	0.92
	RDX100N45		10	0.4	0.55
	RDX050N50	500	5	1.1	1.5
	RDX080N50		8	0.7	0.85
	RDX120N50		12	0.4	0.52
	RDX045N60	600	4.5	1.6	2.1
	RDX060N60		6	0.9	1.25
	RDX100N60		10	0.55	0.75

\*1:  $V_{GS}=10V$

# MOS FET

## Internal Circuit

TSMT / TUMT / VMT / EMT / UMT / SMT / MPT

Note) About more detail information, please see the latest technical specifications.

### Nch

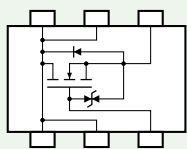


Fig.1

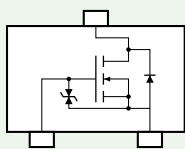


Fig.2

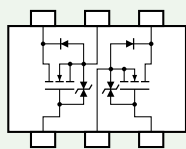


Fig.3

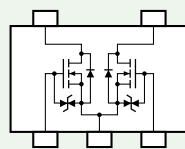


Fig.4

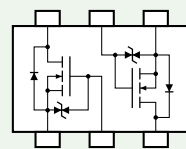


Fig.5

### Nch(MPT3)

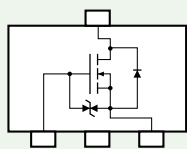


Fig.6

### Nch+SBD

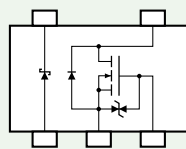


Fig.7

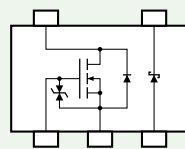


Fig.8

### Pch

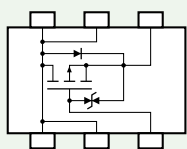


Fig.9

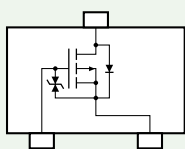


Fig.10

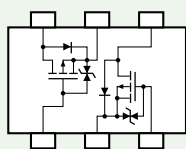


Fig.11

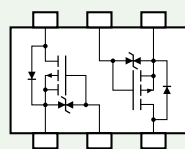


Fig.12

### Pch+SBD

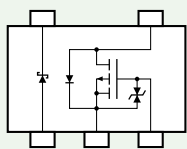


Fig.13

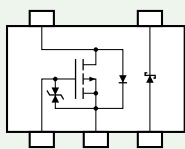


Fig.14

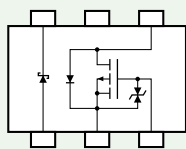


Fig.15

### Nch+Pch

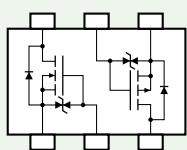


Fig.16

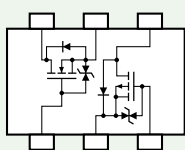


Fig.17

## SOP8 / PSOP8 / PSOP8S

Note) About more detail information, please see the latest technical specifications.

### Nch

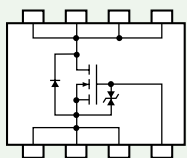


Fig.18

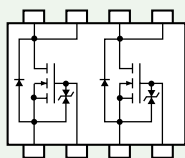


Fig.19

### Pch

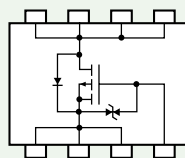


Fig.20

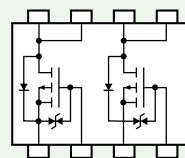
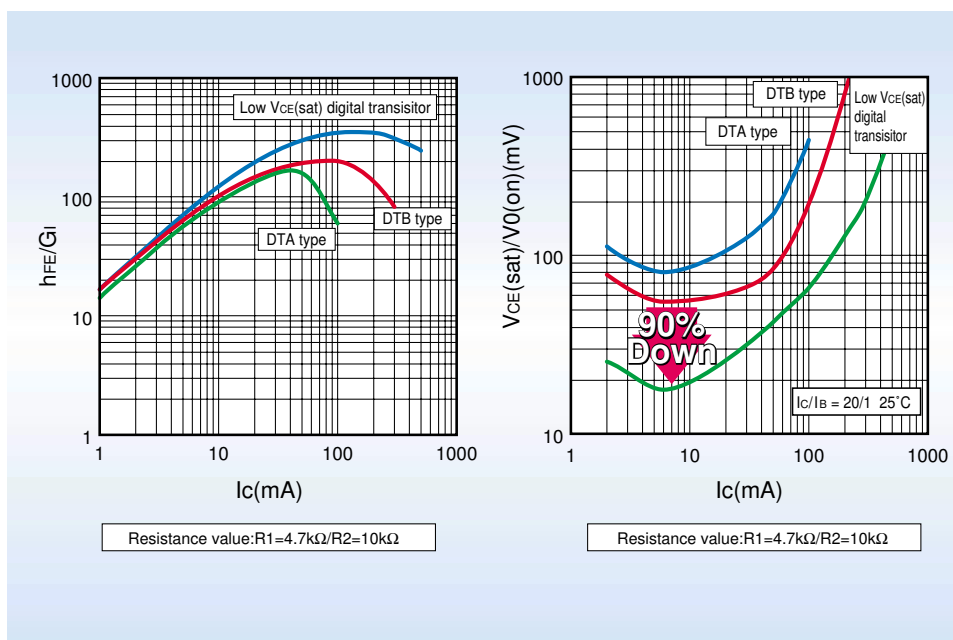


Fig.21

# Low $V_{CE(sat)}$ Miniature Digital Transistors

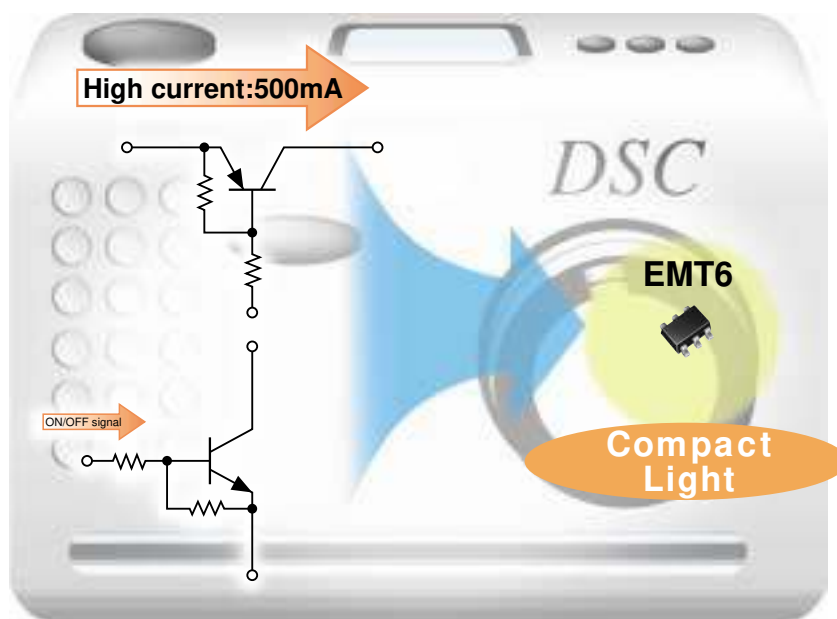
## Single Type



$V_{CC}$ (V)	$I_c$ (mA)	PNP	NPN	Built-in resistors		Package		$G_i$	$V_{O(on)}$ Typ.(mV)
				$R1$ (k $\Omega$ )	$R2$ (k $\Omega$ )	VMT3 	EMT3 		
12	500	DTB513Z	DTD513Z	1	10	●	●	140~	70
		DTB523Y	DTD523Y	2.2	10	●	●	140~	
		DTB543E	DTD543E	4.7	4.7	●	●	120~	
		DTB543X	DTD543X	4.7	10	●	●	140~	
		DTB543Z	DTD543Z	4.7	47	●	●	150~	
30	200	DTB713Z	DTD713Z	1	10	●	●	140~	
		DTB723Y	DTD723Y	2.2	10	●	●	140~	
		DTB743E	DTD743E	4.7	4.7	●	●	120~	
		DTB743X	DTD743X	4.7	10	●	●	140~	
		DTB743Z	DTD743Z	4.7	47	●	●	150~	

## Complex Type

For switing of compact portable devices.



**Ultra-miniature package:EMT6(1612 size)**

Low  $V_{CE(sat)}$  digital transistor and small signal digital transistor in one package.

Ideal for switching in power management circuit.

Circuit	Part No.	Elements	$V_{CC}(V)$	$I_O(mA)$	$h_{FE}$	$R1(k\Omega)$	$R2(k\Omega)$
	<b>EMD28</b>	DTR1 DTB543XM <small>Low <math>V_{CE(sat)}</math> Digital Transistor</small>	-12	-500	140~	4.7	10
		DTR2 DTC144EM	50	30	68~	47	47
	<b>EMD29</b>	DTR1 DTB513ZM <small>Low <math>V_{CE(sat)}</math> Digital Transistor</small>	-12	-500	140~	1	10
		DTR2 DTC114EM	50	50	30~	10	10
	<b>EMD30</b>	DTR1 DTB713ZM <small>Low <math>V_{CE(sat)}</math> Digital Transistor</small>	-30	-200	140~	1	10
		DTR2 DTC114EM	50	50	30~	10	10
	<b>EMF33</b>	DTR1 DTB513ZM <small>Low <math>V_{CE(sat)}</math> Digital Transistor</small>	-12	-500	140~	1	10
		MOS FET 2SK3019	30	0.1	Drive Voltage:2.5V		

# Low $V_{CE(sat)}$ Transistor Series

ROHM development has achieved a Low  $V_{CE(sat)}$  Transistor series in various small surface mount packages. These Low  $V_{CE(sat)}$  Transistors are suitable for digital equipment.

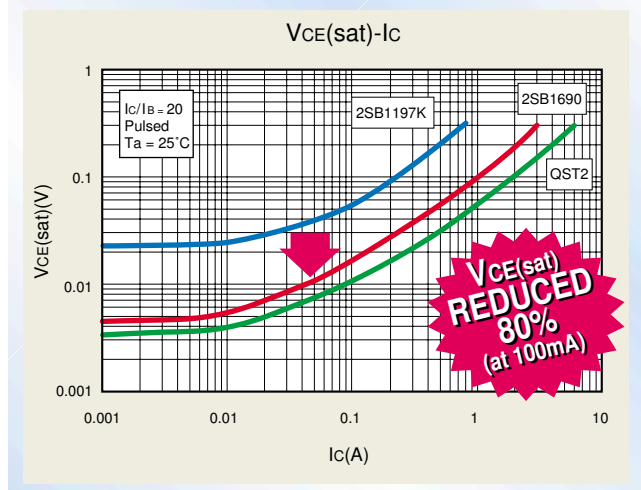
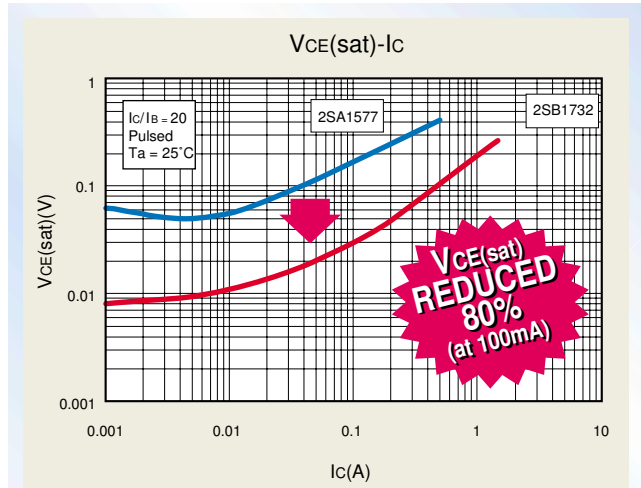
## Features

- Low  $V_{CE(sat)}$  Transistors in small surface mount packages!
- Low Energy Consumption.
- High Collector Current.

## Application

- Switching circuits
- DC/DC converters

For Portable Equipment:  
(i.e. Mobile phone, MD, CD-ROM,  
DVD-ROM, Notebook PC, etc.)



## ● Single Type

VMT3		EMT3		UMT3		TUMT3		TUMT6		TSMT3		TSMT6		$V_{CE0}$ (V)	$I_C$ (A)
PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN		
2SA2030	2SC5663	2SA2018	2SC5585											12	0.5
				2SB1689	2SD2652	2SB1732	2SD2702			2SB1709	2SD2674			12	1.5
						2SB1730	2SD2700	US6T6	US6X5	2SB1690	2SD2653	QST6	QSX5	12	2
								US6T4	US6X3	2SB1705	2SD2670	QST4	QSX3	12	3
										2SB1707	2SD2672			12	4
												QST2	QSX1	12	6
				2SB1694	2SD2656	2SB1733	2SD2703			2SB1710	2SD2675			30	1
						2SB1731	2SD2701	US6T7	US6X6	2SB1695	2SD2657	QST7	QSX6	30	1.5
								US6T5	US6X4	2SB1706	2SD2671	QST5	QSX4	30	2
										2SB1708	2SD2673			30	3
												QST3	QSX2	30	5

● Complex Type

Type	Circuit	EMT6	UMT5/UMT6	TUMT5/TUMT6	TSMT5/TSMT6	Combination	V <sub>CEO</sub> (V)	I <sub>c</sub> (A)
PNP x2		EMT18	UMT18N			2SA2018 2SA2018	12	0.5
				US6T8	QST8	2SB1709 2SB1709	12	1.5
				US6T9	QST9	2SB1710 2SB1710	30	1
NPN x2		EMX18	UMX18N			2SC5585 2SC5585	12	0.5
				US6X7	QSX7	2SD2674 2SD2674	12	1.5
				US6X8	QSX8	2SD2675 2SD2675	30	1
PNP + NPN		EMZ7	UMZ7N			2SA2018 2SC5585	12	0.5
		EMZ8	UMZ8N			2SA2018 2SC4617	12 50	0.5 0.15
					QSZ1	2SB1690 2SD2653	12	2
					QSZ2	2SB1695 2SD2657	30	1.5
PNP + DTr		EMF4	UMF4N			2SA2018 DTC123E	12 50	0.5 0.1
		EMF5	UMF5N			2SA2018 DTC144E	12 50	0.5 0.1
		EMF21	UMF21N			2SA2018 DTC114E	12 50	0.5 0.1
PNP + MOS		EMF6	UMF6N			2SA2018 2SK3019	12 30	0.5 0.1
NPN + DTr		EMF7	UMF7N			2SC5585 DTC123E	12 50	0.5 0.1
		EMF8	UMF8N			2SC5585 DTC144E	12 50	0.5 0.1
		EMF22	UMF22N			2SC5585 DTC114E	12 50	0.5 0.1
NPN + MOS		EMF9	UMF9N			2SC5585 2SK3019	12 30	0.5 0.1
PNP + SBD			UML4N			2SA2018 RB521S-30	12 30	0.5 0.2
				US5L9	QSL9	2SB1707 RB461F	12 20	1.5 0.7
				US5L11	QSL11	2SB1708 RB461F	30 20	1 0.7
					QSL13	2SB1690 RB400D	12 40	2 0.5
NPN + SBD			UML6N			2SC5585 RB521S-30	12 30	0.5 0.2
				US5L10	QSL10	2SD2672 RB461F	12 20	1.5 0.7
				US5L12	QSL12	2SD2673 RB461F	30 20	1 0.7

# Endured Discharge Voltage/ High Speed Switching/Low Noise Transistor Series

## Outline

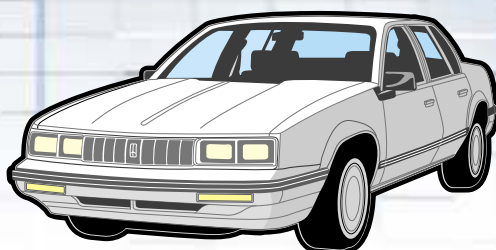
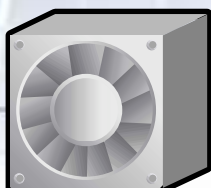
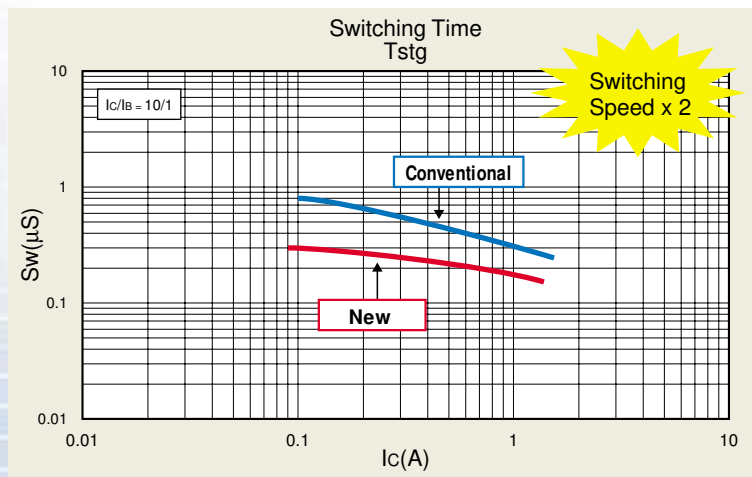
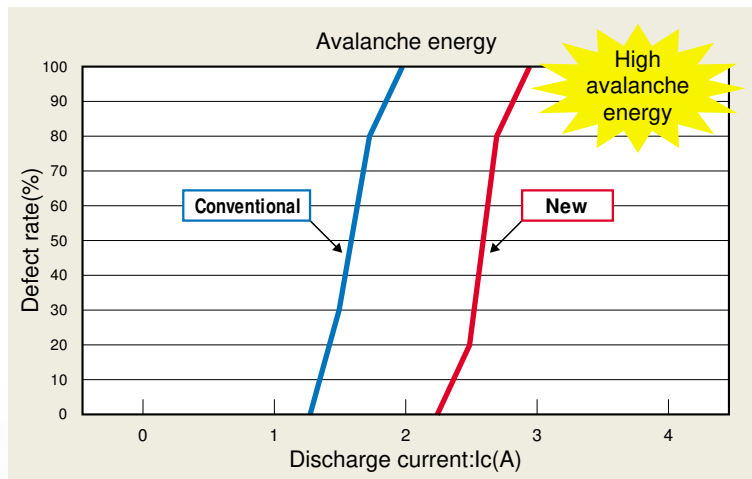
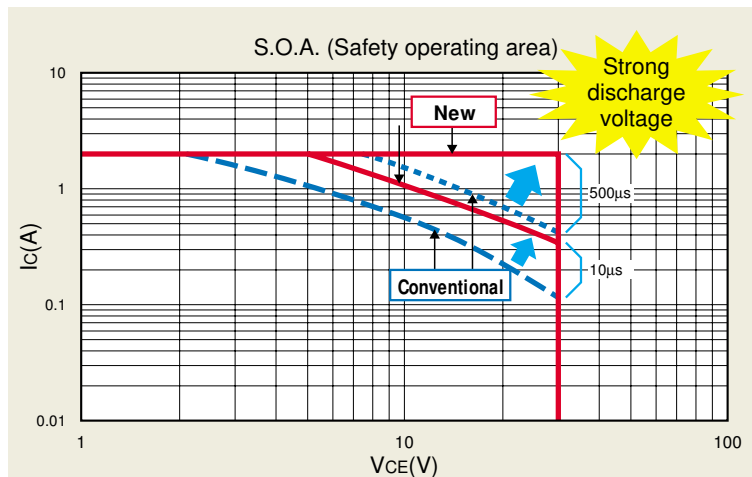
Introducing our new technology, we realized both high power duability and high speed switching in small surface mount packages.

## Features

- High electrical power duability (wide S.O.A) 5 times better
- High speed switching 2 times faster
- High avalanche energy 4 times better




















## Applications

- DC/DC converter
- Motor drive








## Series Line-up

Surface mount devices	Current (A)	Package	Voltage [V]		
			30	60	90
	0.5	<b>UMT3</b>  <b>TUMT3</b>  <b>SMT3</b>  <b>TSMT3</b> 	2SA2047/2SC5729	2SA2088/2SC5876	
				2SA2137/2SC5887	2SA2139/2SC5989
					2SA2054K/2SC5734K
				2SA2090/2SC5868	2SA2054/2SC5734
	1	<b>TUMT3</b>  <b>TUMT6</b>  <b>TSMT3</b>  <b>MPT3</b> 	2SA2136/2SC5986	2SA2138/2SC5988	
					2SA2133/2SC5983
			2SA2048/2SC5730	2SA2092/2SC5865	2SC5734/2SC5917
			2SA2155/2SC6027		2SA2051/2SC5733
	2	<b>TUMT6</b>  <b>TSMT3</b>  <b>MPT3</b>  <b>CPT3</b> 	2SA2131/2SC5981	2SA2132/2SC5982	
			2SA2113/2SC5916	2SA2094/2SC5866	2SA2135/2SC5985
			2SA2049/2SC5731		2SA2109/2SC5918
			2SA2156/2SC6029		2SA2108/2SC5919
	3	<b>TSMT3</b>  <b>MPT3</b>  <b>CPT3</b> 		2SA2095/2SC5867	2SA2135/2SC5985
				2SA2071/2SC5824	
				2SA2072/2SC5825	
	5	<b>TSMT3</b>  <b>MPT3</b>  <b>CPT3</b> 	2SA2134/2SC5984*		
			2SA2157/2SC6028		
			2SA2050/2SC5732	2SA2096/2SC5881	
	10	<b>CPT3</b> 	2SA2143/2SC6002	2SA2147/2SC6006	


\*V<sub>CEO</sub>=45V



Through-hole devices	Current (A)	Package	Voltage [V]		
			30	60	90
	0.5	<b>SPT</b> 	2SA2085S/2SC5873S	2SA2089S/2SC5877S	2SA2115S/2SC5920S
	1		2SA2086S/2SC5874S	2SA2091S/2SC5879S	2SA2106S/2SC5921S
	2	<b>ATV</b> 			2SA2110/2SC5922
			2SA2087/2SC5875	2SA2093/2SC5880	2SA2107/2SC5923
	3	<b>TO220FN</b> 		2SA2073/2SC5826	
				2SA2160/2SC6007	
	10			2SA2149/2SC6005	


# Endured Discharge Voltage/ High Speed Switching Transistor Series


## Characteristics

● Surface mount devices


Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<b>UMT3</b> P <sub>C</sub> =0.2W 	<b>2SA2047</b>	<b>2SC5729</b>	30	0.5	1	120~390	Q,R	40/40	100/120	40/50
	<b>2SA2088</b>	<b>2SC5876</b>	60			120~270 /120~390	Q/Q,R	40/70	110/130	60/80


Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<b>TUMT3</b> P <sub>C</sub> =0.5W 	<b>2SA2136</b>	<b>2SC5986</b>	30	1	2	120~390	Q,R	30/30	100/120	20/35
	<b>2SA2137</b>	<b>2SC5987</b>	60	0.5	1	120~270 /120~390	Q/Q,R	35/70	100/130	20/80
	<b>2SA2138</b>	<b>2SC5988</b>		1	2			30/50	100/130	30/50
	<b>2SA2139</b>	<b>2SC5889</b>	90	0.5	1			35/50	160/200	60/80
<b>TUMT6</b> P <sub>C</sub> =0.5W 	<b>2SA2131</b>	<b>2SC5981</b>	30	2	4	120~270 /120~390	Q/Q,R	25/25	100/100	20/20
	<b>2SA2132</b>	<b>2SC5982</b>	60	2	4			25/30	100/120	30/35
	<b>2SA2133</b>	<b>2SC5983</b>	90	1	2			30/50	150/150	50/50

Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<b>SMT3</b> P <sub>C</sub> =0.2W 	<b>2SA2048K</b>	<b>2SC5730K</b>	30	1	2	120~390	Q,R	30/30	100/120	20/35
	<b>2SA2054K</b>	<b>2SC5734K</b>	90	0.5	1	120~270 /120~390	Q/Q,R	35/30	160/200	60/80


Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<b>TSMT3</b> P <sub>C</sub> =0.5W 	<b>2SA2048</b>	<b>2SC5730</b>	30	1	2	120~390	Q,R	30/30	100/120	20/35
	<b>2SA2113</b>	<b>2SC5916</b>		2	4			25/25	100/100	20/20
	<b>2SA2134</b>	<b>2SC5984*</b>		5	10			30/60	100/130	50/20
	<b>2SA2090</b>	<b>2SC5868</b>	60	0.5	1	120~270 /120~390	Q/Q,R	70/70	130/130	80/80
	<b>2SA2092</b>	<b>2SC5865</b>		1	2			30/50	100/130	30/50
	<b>2SA2094</b>	<b>2SC5866</b>		2	4			25/50	100/120	30/35
	<b>2SA2095</b>	<b>2SC5867</b>		3	6			20/50	150/150	20/60
	<b>2SA2054</b>	<b>2SC5734</b>	90	0.5	1			35/50	160/200	60/80
	<b>2SA2114</b>	<b>2SC5917</b>		1	2			30/50	150/150	50/50
	<b>2SA2135</b>	<b>2SC5985</b>		2	4			30/50	280/300	50/80


\*45V


Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<b>MPT3</b> P <sub>C</sub> =0.5W 	<b>2SA2155</b>	<b>2SC6027</b>	30	1	2	120~390	Q,R	30/30	100/120	20/35
	<b>2SA2049</b>	<b>2SC5731</b>		2	4			20/25	120/100	20/20
	<b>2SA2157</b>	<b>2SC6028</b>		5	7			25/50	110/130	20/25
	<b>2SA2071</b>	<b>2SC5824</b>	60	3	6	120~270 /120~390	Q/Q,R	20/50	130/150	20/30
	<b>2SA2051</b>	<b>2SC5733</b>	90	1	2			30/50	150/150	50/50
	<b>2SA2109</b>	<b>2SC5918</b>		2	4			25/50	280/300	50/80

Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<b>CPT3</b> P <sub>C</sub> =1W 	<b>2SA2156</b>	<b>2SC6029</b>	30	2	4	120~390	Q,R	20/25	120/100	20/20
	<b>2SA2050</b>	<b>2SC5732</b>		5	10			25/60	100/130	20/25
	<b>2SA2143</b>	<b>2SC6002</b>		10	15			30/30	130/150	30/40
	<b>2SA2072</b>	<b>2SC5825</b>	60	3	6	120~270 /120~390	Q/Q,R	20/50	130/150	20/30
	<b>2SA2096</b>	<b>2SC5881</b>		5	10			25/70	130/150	25/25
	<b>2SA2147</b>	<b>2SC6006</b>		10	15			25/60	120/150	20/40
	<b>2SA2108</b>	<b>2SC5919</b>	90	2	4			70/70	200/200	70/70

● Through-hole devices

Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<b>SPT</b> P <sub>C</sub> =0.3W 	<b>2SA2085S</b>	<b>2SC5873S</b>	30	0.5	1	120~390	Q,R	40/40	100/120	40/50
	<b>2SA2086S</b>	<b>2SC5874S</b>		1	2			30/30	100/120	20/35
	<b>2SA2089S</b>	<b>2SC5877S</b>	60	0.5	1	120~270 /120~390	Q/Q,R	70/35	130/100	80/60
	<b>2SA2091S</b>	<b>2SC5879S</b>		1	2			30/50	100/130	30/50
	<b>2SA2115S</b>	<b>2SC5920S</b>	90	0.5	1			50/50	200/200	80/80
	<b>2SA2106S</b>	<b>2SC5921S</b>		1	2			30/50	150/150	50/50

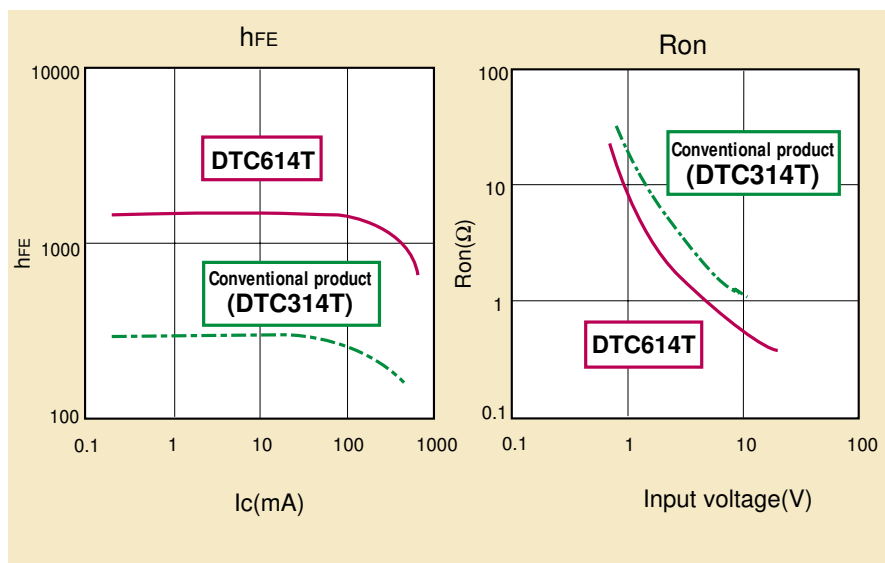
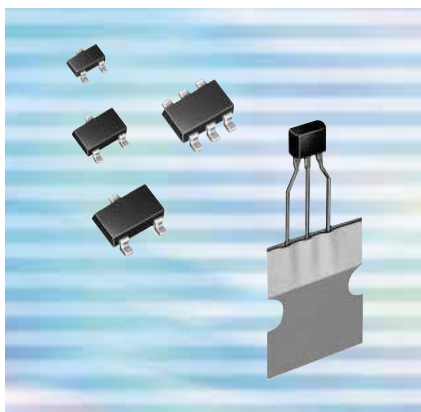
Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<div>ATV</div> <div>PC=1W</div> <div></div>	2SA2087	2SC5875	30	2	4	120~390	Q,R	25/25	100/100	20/20
	2SA2093	2SC5880	60			120~270 /120~390	Q/Q,R	25/50	100/120	30/35
	2SA2073	2SC5826		3	6			20/50	130/150	20/30
	2SA2110	2SC5922	90	1	2	30/50		150/150	50/50	
	2SA2107	2SC5923		2	4	25/50		280/300	50/80	

Package	Part No.		BV <sub>CEO</sub> [V]	I <sub>C</sub> [A]	I <sub>CP</sub> [A]	h <sub>FE</sub>	RANK	SW time [ns]		
	PNP	NPN						ton	tstg	tf
<b>TO220FN</b> P <sub>C</sub> =2W 	<b>2SA2160</b>	<b>2SC6007</b>	60	3	6	120~270 /120~390	Q/Q,R	50/50	130/150	50/30
	<b>2SA2149</b>	<b>2SC6005</b>	60	10	15			30/25	130/150	50/30

Note) About more detail information, please see the latest technical specifications.

# Muting Transistors

## High- $\beta$ & High-BVEBO



### Built-in Resistor type

Part No.	R1/R2(kΩ)	Internal circuit	UMT3	SMT3	SPT	BVEBO(V)	BVCEO(V)	Ic(mA)	Ron(Ω)
DTC623T	2.2/ —		●	●	●	12	20	600	0.4
DTC643T	4.7/ —		●	●	●				0.55
DTC663E	6.8/6.8		●	●	—				0.9
DTC614T	10/ —		●	●	●				0.9

Part No.	R1/R2(kΩ)	Internal circuit	Elements	SMT6	BVEBO(V)	BVCEO(V)	Ic(mA)	Ron(Ω)
IMH24	2.2/ —		DTC623T	●	12	20	600	0.4
IMH23	4.7/ —		DTC643T	●				0.55
IMH22	6.8/6.8		DTC663E	●				0.9
IMH21	10/ —		DTC614T	●				0.9

## Features

- Low  $R_{DS(on)}$
- High  $h_{FE}$
- $BV_{EBO}=12V, 25V$
- Compound packages

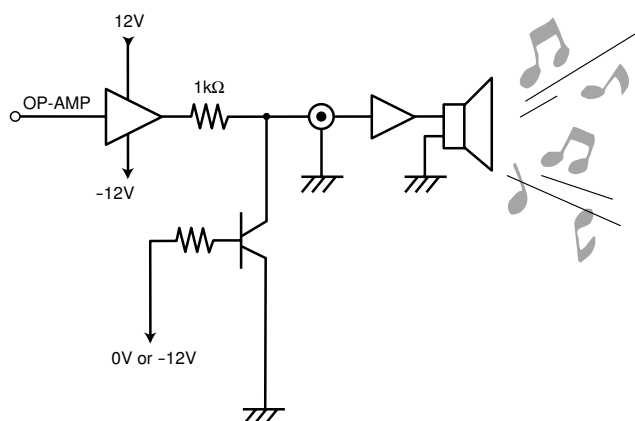
## Applications



Home Audio



Car Stereo



### High- $\beta$ • High- $BV_{EBO}$

Single type								
EMT3	UMT3	SMT3	SPT	$BV_{EBO}(V)$	$BV_{CEO}(V)$	$I_C(mA)$	$h_{FE}$	$R_{on}(\Omega)$
—	—	<b>2SD2704K</b>	<b>2SD2705S</b>	25	20	300	820~2700	0.7
<b>2SD2654</b>	<b>2SD2351</b>	<b>2SD2226K</b>	<b>2SD2277S</b>	12	50	150	820~2700	0.9
—	—	<b>2SD2114K</b>	<b>2SD2144S</b>	12	20	600	820~2700	0.8

Complex type								
EMT6	SMT6	Circuit	Elements	$BV_{EBO}(V)$	$BV_{CEO}(V)$	$I_C(mA)$	$h_{FE}$	$R_{on}(\Omega)$
—	<b>IMX25</b>		<b>2SD2704K</b>	25	20	300	800~2700	0.7
<b>EMX26</b>	—		<b>2SD2654</b>	12	50	150	820~2700	0.9
—	<b>IMX9</b>		<b>2SD2114K</b>	12	20	600	560~2700	0.8

# External Dimensions (Unit:mm)

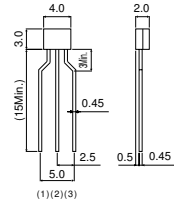
## Surface mount devices

<b>VMT3</b>  (1)Base(IN)(Gate) (2)Emitter(GND)(Source) (3)Collector(OUT)(Drain)	<b>SST3 &lt;SOT-23&gt;</b>  (1)Emitter(GND)(Source) (2)Base(IN)(Gate) (3)Collector(OUT)(Drain)	
<b>EMT3 (SC-75A) &lt;SOT-416&gt;</b>  (1)Emitter(GND)(Source) (2)Base(IN)(Gate) (3)Collector(OUT)(Drain)	<b>EMT5</b>  Each lead has same dimensions	<b>EMT6</b>  Each lead has same dimensions
<b>UMT3 (SC-70) &lt;SOT-323&gt;</b>  (1)Emitter(GND)(Source) (2)Base(IN)(Gate) (3)Collector(OUT)(Drain)	<b>UMT5 (SC-88A) &lt;SOT-353&gt;</b>  Each lead has same dimensions	<b>UMT6 (SC-88) &lt;SOT-363&gt;</b>  Each lead has same dimensions
<b>TUMT3</b>  (1)Base(Gate) (2)Emitter(Source) (3)Collector(Drain)	<b>TUMT5</b>  Each lead has same dimensions	<b>TUMT6</b>  Each lead has same dimensions
<b>SMT3 (SC-59) &lt;SOT-346&gt;</b>  (1)Emitter(GND)(Source) (2)Base(IN)(Gate) (3)Collector(OUT)(Drain)	<b>SMT5 (SC-74A)</b>  Each lead has same dimensions	<b>SMT6 (SC-74) &lt;SOT-457&gt;</b>  Each lead has same dimensions
<b>TSMT3</b>  (1)Base(Gate) (2)Emitter(Source) (3)Collector(Drain)	<b>TSMT5</b>  Each lead has same dimensions	<b>TSMT6</b>  Each lead has same dimensions
<b>SOP8</b>  Each lead has same dimensions	<b>PSOP8</b>  Each lead has same dimensions	<b>PSOP8S</b>  Each lead has same dimensions
<b>MPT3 (SC-62) &lt;SOT-89&gt;</b>  (1)Base(Gate) (2)Collector(Drain) (3)Emitter(Source)	<b>CPT3 (SC-63) &lt;SOT-428&gt;</b>  (1)Base(Gate) (2)Collector(Drain) (3)Emitter(Source)	<b>D2PAK</b> 

Notes: 1) Characters in ( ) under package designation denotes JEITA No. Characters in < > under package designation denotes JEDEC No. 2) For dimensions refer to the data sheet.

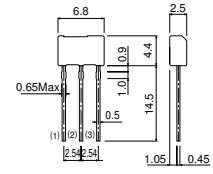
# Through-hole devices

## SPT (SC-72)



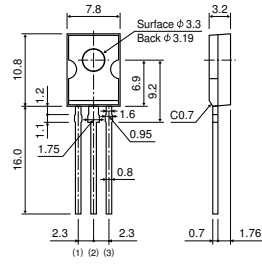
- (1)Emitter
- (2)Collector
- (3)Base

## ATV



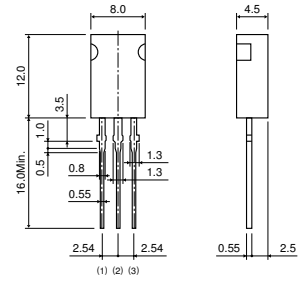
- (1)Emitter
- (2)Collector
- (3)Base

## TO-126FP



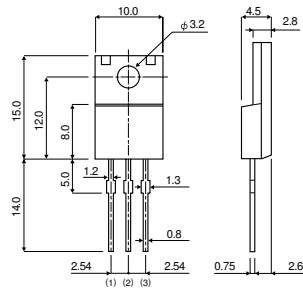
- (1)Emitter
- (2)Collector
- (3)Base

## HRT



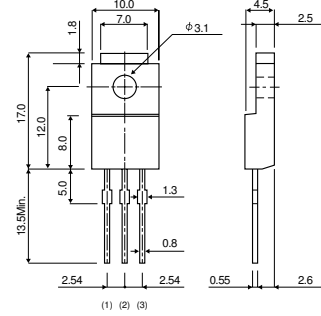
- (1)Emitter
- (2)Collector
- (3)Base

## TO-220FN



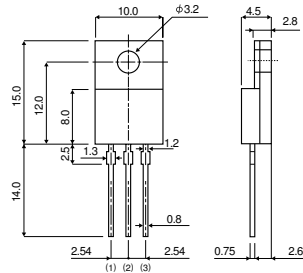
- (1)Base(Gate)
- (2)Collector(Drain)
- (3)Emitter(Source)

## TO-220FP



- (1)Base
- (2)Collector
- (3)Emitter

## TO-220FM



- (1)Base(Gate)
- (2)Collector(Drain)
- (3)Emitter(Source)

Notes: 1) Characters in ( ) under package designation denotes JEITA No. Characters in < > under package designation denotes JEDEC No. 2) For dimensions refer to the data sheet.

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