

TOSHIBA

Leading Innovation >>>

TOSHIBA POWER DEVICES DTMOS II

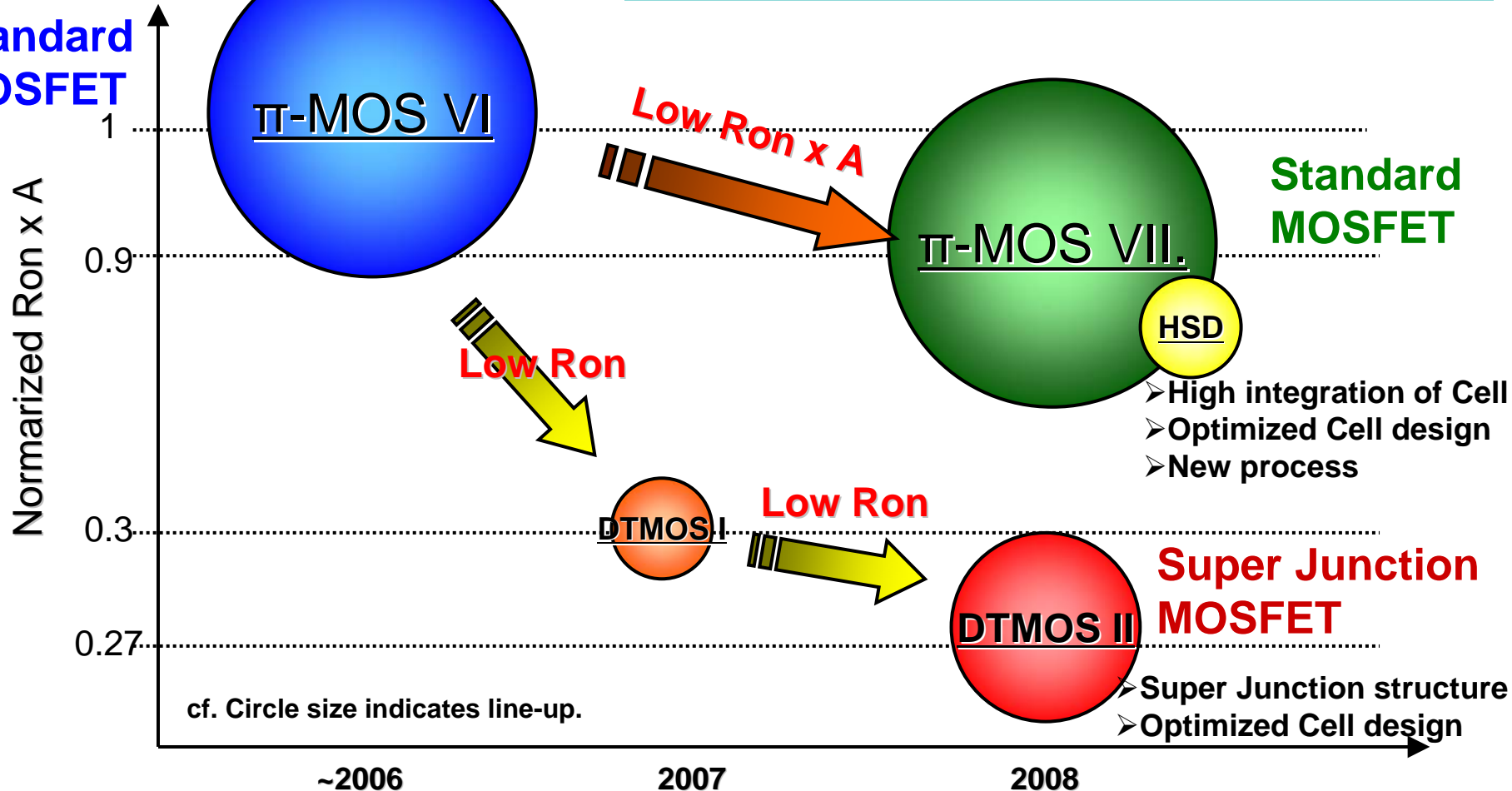
Toshiba Electronics Europe GmbH

Power Semiconductors

European Marketing & Engineering Department Q3 2009

DTMOS II is designed to meet the market Request
 "Low Ron x A"

Standard
MOSFET

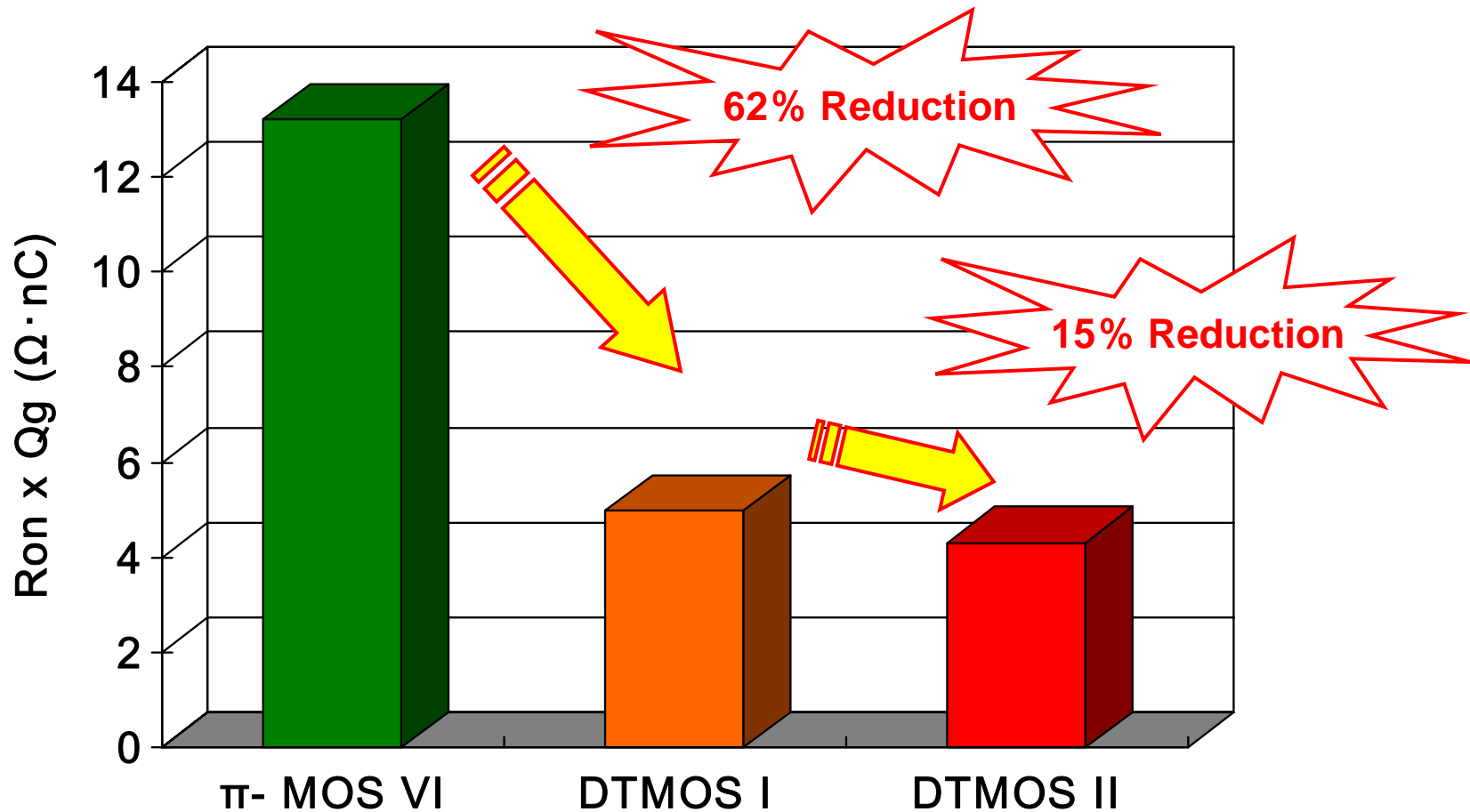


NEW: DTMOS II
Super Junction MOSFET's

DTMOS II Super Junction MOSFET : Feature

DTMOS I's $R_{on} \times Q_g$ is **62%** lower than conventional MOSFET.

In our target, DTMOS II (2nd generation) is moreover **15%** lower than DTMOS I.



DTMOSII Super Junction MOSFET

600V Product Range **+ New: 650V Item!!**

- DTMOS II-> The way to maximize Efficiency, whilst minimizing Package size..

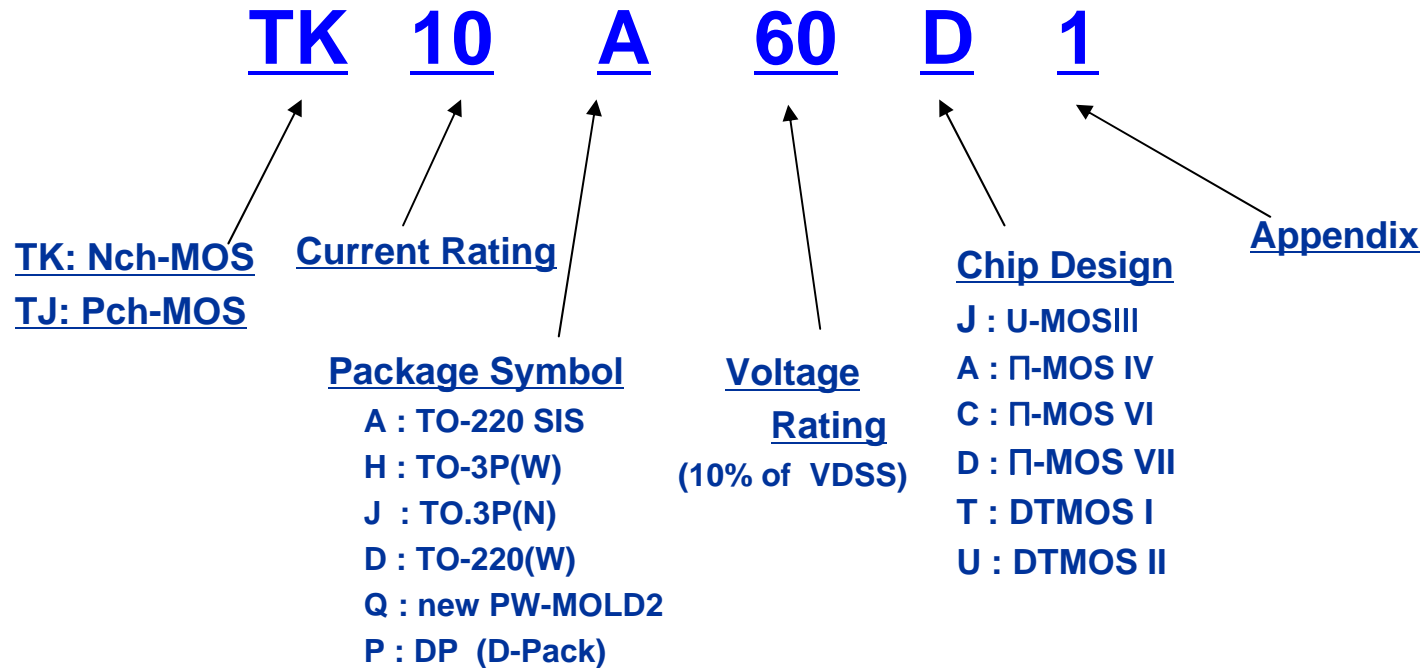
Features

- Low Ron by Super Junction Structure
- Low Ron x Qg Characteristics
- Low Gate capacitance
- Guaranteed Avalanche Durability
- High Ruggedness Concept Products
- Suitable for: SMPS Main Switch & PFC, Lamp Ballast

- Second Product Generation is available !

TOSHIBA Power MOS NEW Naming System

Product Category can get easily detected



DTMOS: initial Package: TO-220SIS (Smart ISolation)

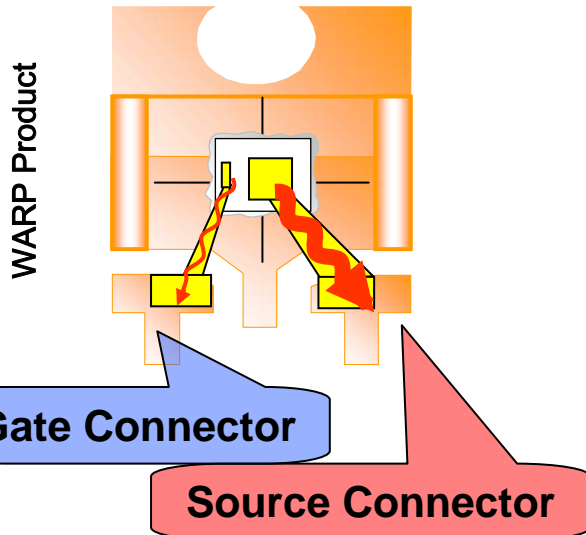


**Copper Connector
is replacing Aluminium Bonding wire
-> “Warp Line Product”**

Application : Power Supply / Motor Drive / Lamp Ballast

< Feature of Cu Connector >

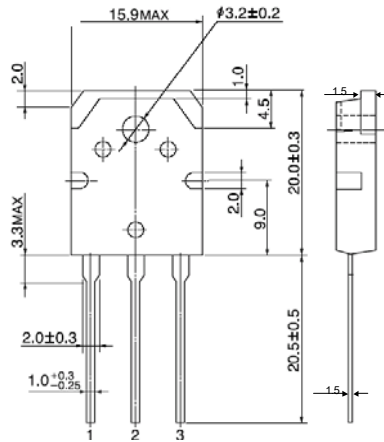
- <1.> Larger Fusing Current ⇒[exceed 2 times]**
- <2.> Lower Connecting Resistance
(between chip and lead frame) ⇒[reduced by50%]**
- <3.> Better Heat Dissipation by Cu Connector**
- <4.> Higher Production Efficiency than conventional
package by WARP Production Line**



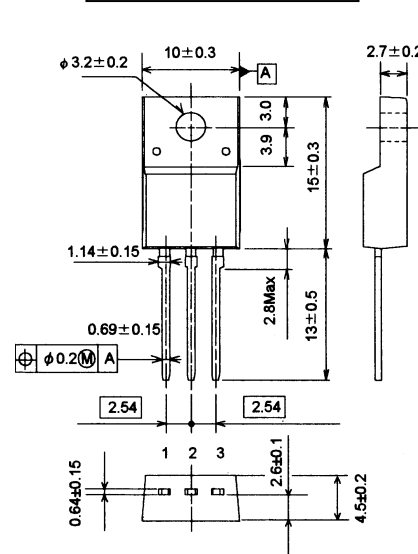
DTMOS Super Junction Mosfet

■ Package Dimensions Actual Status ->

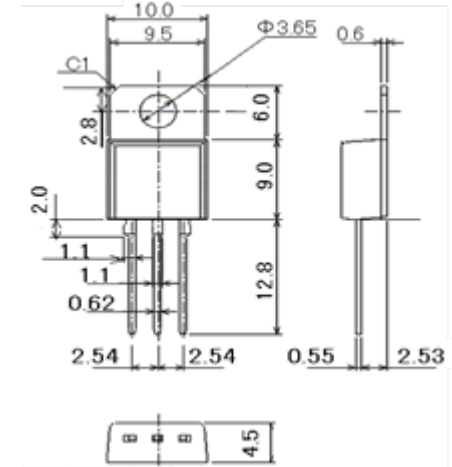
TO-3P(N)



TO-220SIS



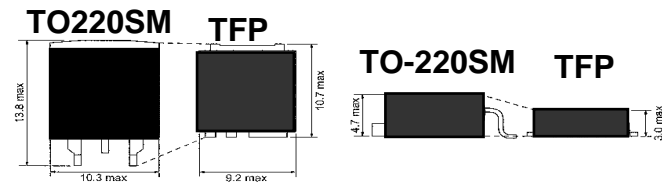
TO-220W



TFP

■ SMD Package:

-> TFP



Competition -> Toshiba

DTMOS I / II Line Up

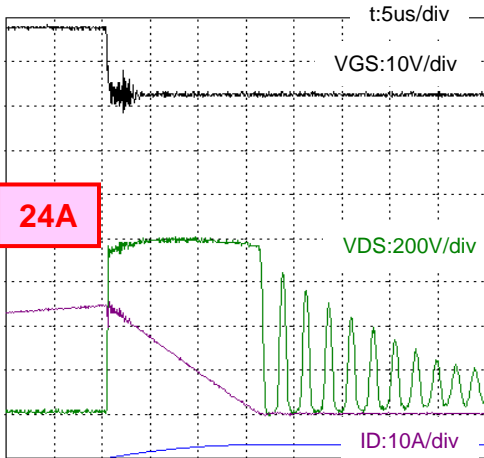
P/N	Generation	Packages	Vds	Id	Rds(on)	Qg	Status
TK50J60U	DTMOS II	TO-3P(N)	600V	50A	0,065Ohm	70nC	Sample
TK40J60T	DTMOS I	TO-3P(N)	600V	40A	0,080hm	67nC	MP
TK20J60U	DTMOS II	TO-3P(N)	600V	20A	0,190hm	27nC	MP
TK20A60U	DTMOS II	TO220SIS	600V	20A	0,190hm	27nC	MP
TK20D60U	DTMOS II	TO220W	600V	20A	0,190hm	27nC	MP
TK20X60U	DTMOS II	TFP (SMD)	600V	20A	0,190hm	27nC	Sample
TK15J60U	DTMOS II	TO-3P(N)	600V	15A	0,30hm	17nC	MP
TK15A60U	DTMOS II	TO220SIS	600V	15A	0,30hm	17nC	MP
TK15D60U	DTMOS II	TO220W	600V	15A	0,30hm	17nC	MP
TK15X60U	DTMOS II	TFP (SMD)	600V	15A	0,30hm	17nC	Sample
TK12J60U	DTMOS II	TO-3P(N)	600V	12A	0,40hm	14nC	MP
TK12A60U	DTMOS II	TO220SIS	600V	12A	0,40hm	14nC	MP
TK12D60U	DTMOS II	TO220W	600V	12A	0,40hm	14nC	MP
TK12X60U	DTMOS II	TFP (SMD)	600V	12A	0,40hm	14nC	Sample
TK13A65U	DTMOS II	TO220SIS	650V	13A	0,380hm	17nC	Sample
TK17A65U	DTMOS II	TO220SIS	650V	17A	0,30hm	tbd	Under development

- 10 Item in Mass Production
- New: 650V Class
- New: 600V 50A TO-3P(N)

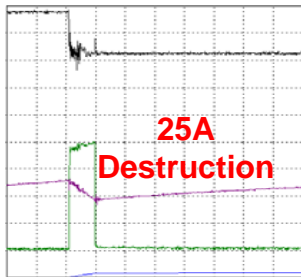


DTMOS II TK15A60U Parameter example

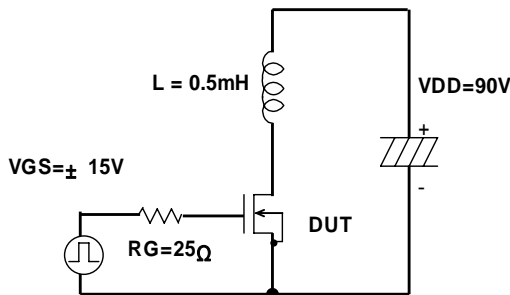
Avalanche waveform



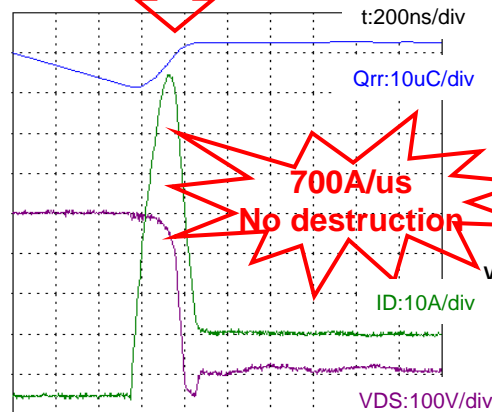
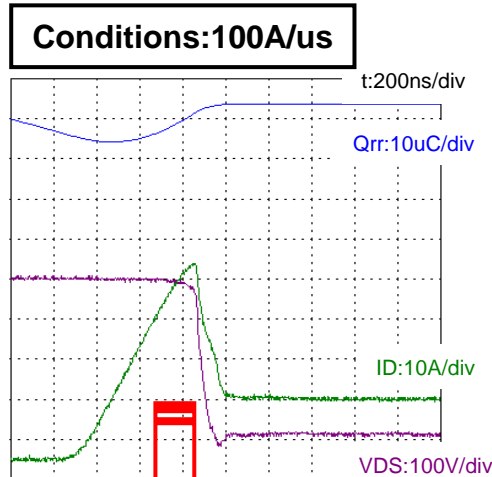
Conditions:
 VDD=90V,
 L=500μH,
 VGS=±15V,
 RG=25Ω, 25°C



【TEST Circuit】

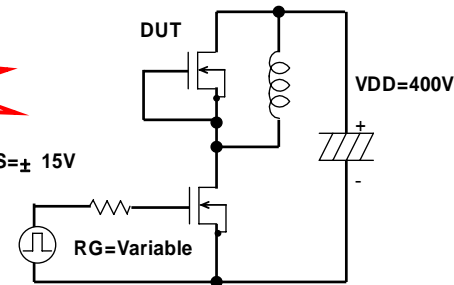


Reverse recovery waveform



Conditions:
 VDD=400V,
 VGS=0V,
 ID=15A, 150°C

【TEST Circuit】



Avalanche capability is 150% rated current.

DTMOS II's Reverse recovery capability is so high due to high ruggedness design.

Super Junction MOSFET DTMOS II: in TFP-Package



DTMOS II series 600V

Ron(max)	Package	ES	MP
0,19	TFP	OK	'09 / Q2
0,3	TFP	OK	'09 / Q2
0,4	TFP	OK	'09 / Q2

TFP-Package:

1. Feature

Small and Thin Package 9 x 10 x 2.8 mm

(Reduced by 42 % compared with TO-220SM)

High Power Dissipation ($> P_D=100W$)

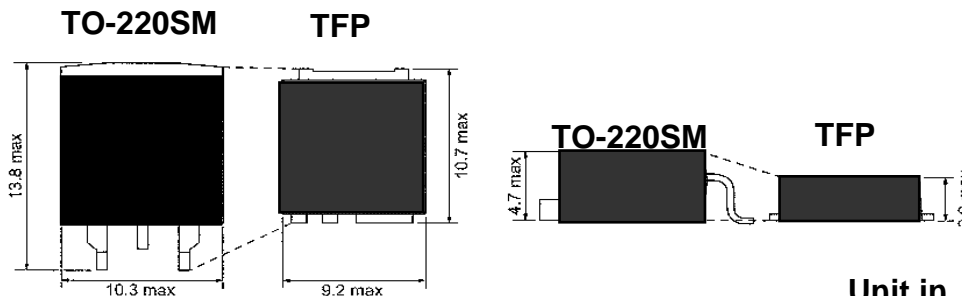
High Speed and Low ON Resistance

4-pin Structure (Reducing the risk that output will affect Input)

2. Application

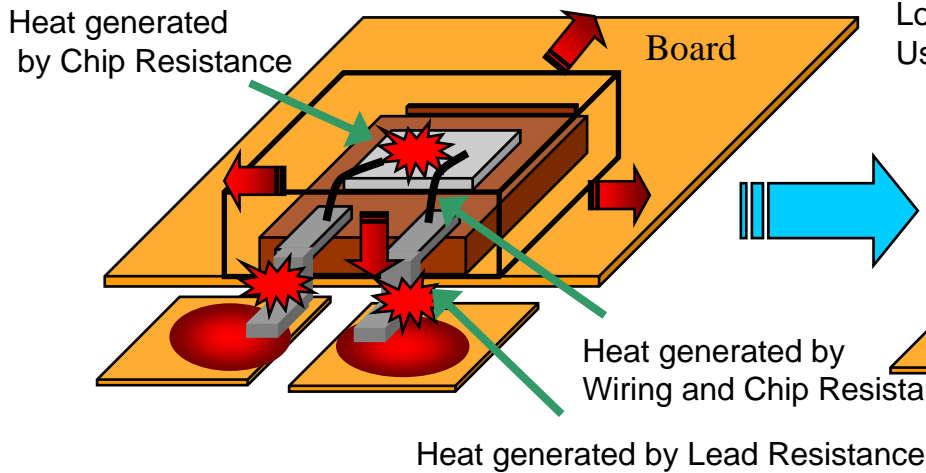
AC-DC Converters

3. Package Size

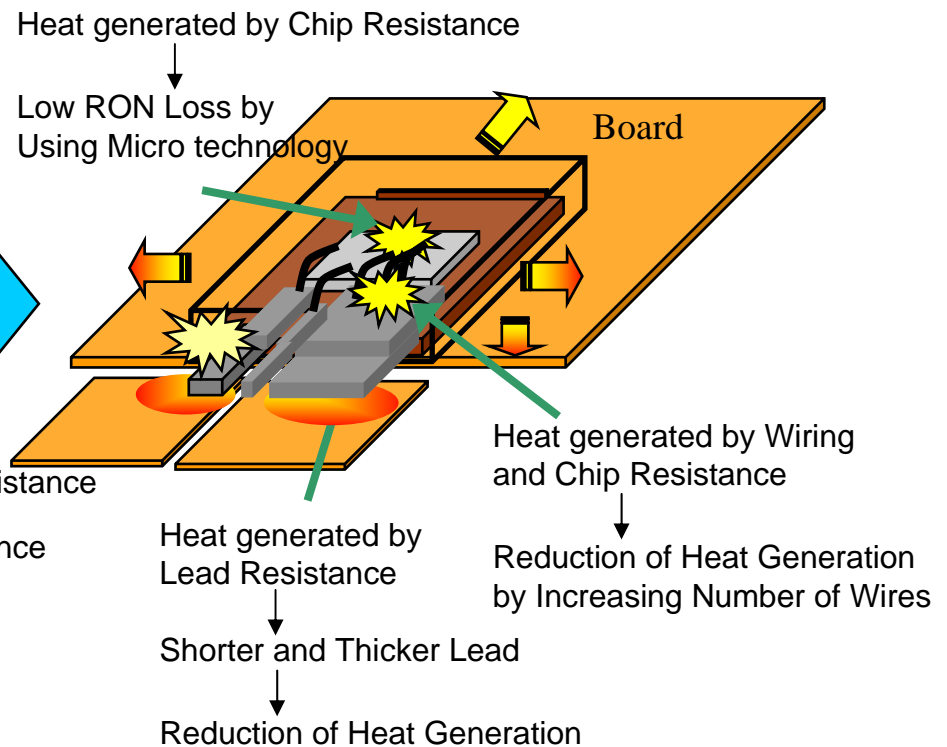


Heat Generating Object and Thermal Path

Conventional Package (TO-220SM)



TFP (Thin Flat Package)



Power Package Code

Cross Table

Transistors & Diodes

TOSHIBA	TYPE	Standard Name	EIAJ	JEDEC	Competitor's Name	Category	
						Med-Power Tr.	Rectifier
TO-3P(L)	LEAD	TO-264		TO-264	TO-264	0	
TO-3P(LH)	LEAD	TO-264		TO-264	TO-264	0	
TO-3P(H)IS	LEAD	TO-247AD		TO-247AD	TO-247	0	
TO-3P(N)	LEAD	TO-247AD	SC-65	TO-247AD	TO-247	0	0
TO-3P(N)IS	LEAD	TO-247AD		TO-247AD	TO-247AC	0	0
TO-3P(SM)	SMD	D3-PAK			D3-PAK	0	
TFP	SMD					0	0
TO-220AB	LEAD	TO-220AB	SC-46	TO-220AB		0	0
TO-220FL	LEAD	I2-PAK		TO-220		0	0
TO-220SM	SMD	D2-PAK		TO-263AB	D2-PAK	0	0
TO-220NIS	LEAD	TO-220	SC-67	TO-220		0	0
TO-126(IS)	LEAD	TO-126				0	
POWER MOLD	LEAD	I-PAK	SC-64	TO-251AA	I-PAK	0	
POWER MOLD	SMD	D-PAK	SC-64	TO-252AB	D-PAK	0	
DP	LEAD	I-PAK	SC-64	TO-251AA	I-PAK	0	
DP	SMD	D-PAK	SC-64	TO-252AB	D-PAK	0	
LSTM	LEAD	TO-92MOD	SC-51	TO-92MOD	TO-92L	0	
PW MINI	SMD	SOT-89	SC-62		SOT-89	0	
SP	SMD	SOT-223		TO-261AA		0	
SOP-ADVANCE	SMD				PowerPAK LF-PAK	0	
SOP-8	SMD	SO-8		SO-8		0	
TSSOP-8	SMD	TSSOP-8		MO-153AA		0	
VS-6	SMD	TSOP-6			SM-6 Micro6	0	
TSM	SMD	SOT-23	SC-59	TO-236AB	Micro3	0	
VS-8	SMD				ChipFET	0	
DO-41/S/SS	LEAD	DO-41		DO-41			0
DO-15/L	LEAD	DO-15	SC-39	DO-15			0
USC	SMD	SOD-323					0
US-FLAT	SMD						0
S-FLAT	SMD	SOD123					0
M-FLAT	SMD						0
I-FLAT	SMD	SMA					0
I-FLAT2	SMD	SMB					0

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