40V N-Channel Trench MOSFET

Lead Free Package and Finish

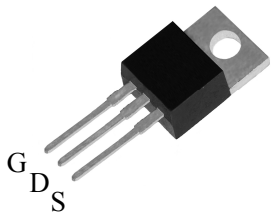
BV_{DSS}	$R_{DS(ON),typ.}$	I_D
40V	3.0mΩ	206A

General Features

- Proprietary New Trench Technology
- $R_{DS(ON),typ.}$=3.0m Ω@V_{GS}=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

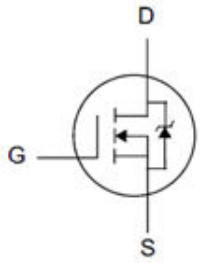
Applications

- DC-DC Converters
- DC-AC Inverters
- Power Supply



TO-220

Package No to Scale



Ordering Information

Part Number	Package	Brand
PTP04N04N	TO-220	

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter	PTP04N04N	Unit
V_{DSS}	Drain-to-Source Voltage[1]	40	V
V_{GSS}	Gate-to-Source Voltage	±20	
I_D	Continuous Drain Current[2]	206	A
	Continuous Drain Current[3]	80	
I_{DM}	Pulsed Drain Current at V_{GS}=10V[2,4]	480	
E_{AS}	Single Pulse Avalanche Energy	500	mJ
dv/dt	Peak Diode Recovery dv/dt[3]	5.0	V/ns
P_D	Power Dissipation	300	W
	Derating Factor above 25℃	2	W/℃
T_L T_{PAK}	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds	300 260	℃
T_J& T_{STG}	Operating and Storage Temperature Range	-55 to 175	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	PTP04N04N	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.5	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	

©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

Electrical Characteristics

OFF Characteristics

T_J =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	40	--	--	V	V_{GS}=0V, I_D=250uA
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	uA	V_{DS}=40V, V_{GS}=0V
		--	--	100		V_{DS}=32V, V_{GS}=0V, T_J =125℃
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	V_{GS}=+20V, V_{DS}=0V
		--	--	-100		V_{GS}=-20V, V_{DS}=0V

ON Characteristics

T_J =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance[4]	--	3.0	4.0	mΩ	V_{GS}=10V, I_D=80A[5]
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	V_{DS}=V_{GS}, I_D=250uA

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	2980	--	pF	V_{GS}=0V, V_{DS}=25V, f=1.0MH_Z
C_{rss}	Reverse Transfer Capacitance	--	230	--		
C_{oss}	Output Capacitance	--	430	--		
R_g	Gate Series Resistance	--	3.5	--	Ω	f=1.0MH_Z
Q_g	Total Gate Charge	--	50.8	--	nC	V_{DD}=20V, I_D=80A, V_{GS}=0 to 10V
Q_{gs}	Gate-to-Source Charge	--	14.7	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	8.0	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	16	--	nS	V_{DD}=20V, I_D=50A, V_{GS}= 10V R_G=10 Ω
t_{rise}	Rise Time	--	59	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	74	--		
t_{fall}	Fall Time	--	41	--		

©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

Source-Drain Body Diode Characteristics

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current[4]	--	--	206	A	Integral PN-diode in MOSFET
I_{SM}	Pulsed Source Current[4]	--	--	480		
V_{SD}	Diode Forward Voltage	--	--	1.2	V	I_S=80A, V_{GS}=0V
trr	Reverse recovery time	--	49.2	--	ns	V_{GS}=0V ,I_F=80A, di_F/dt=100A/μs
Qrr	Reverse recovery charge	--	35.9	--	nC	

Note:

[1] T_J=+25℃ to +175℃ .
[2] Silicon limited current only.
[3] Package limited current.
[4] Repetitive rating; pulse width limited by maximum junction temperature.
[5] Pulse width≤380μs; duty cycle≤2%.

©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

Typical Characteristics

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

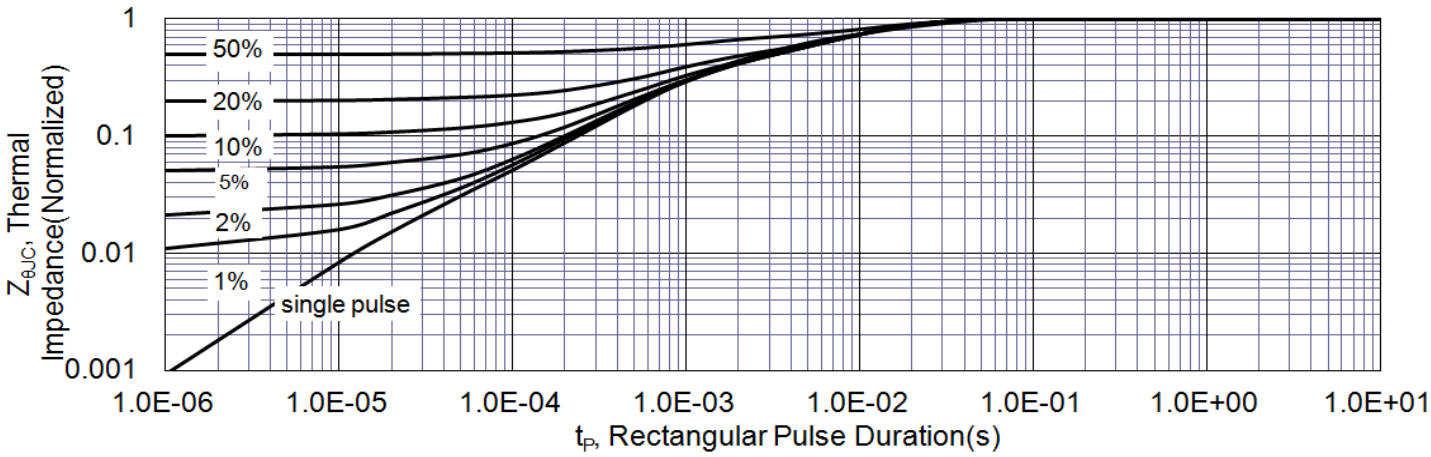


Figure 2. Maximum Power Dissipation vs Case Temperature

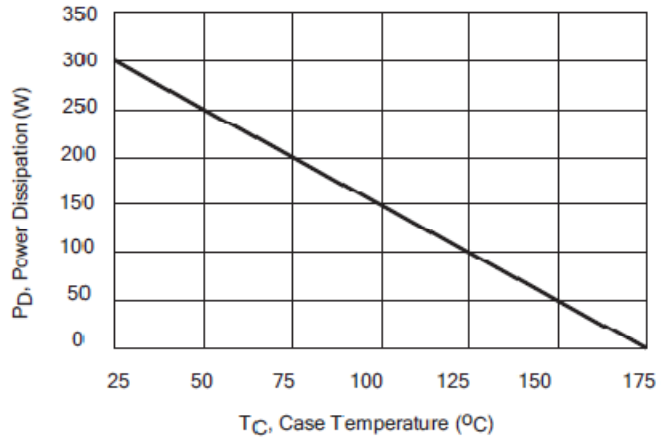


Figure3. Maximum Continuous Drain Current vs Case Temperature

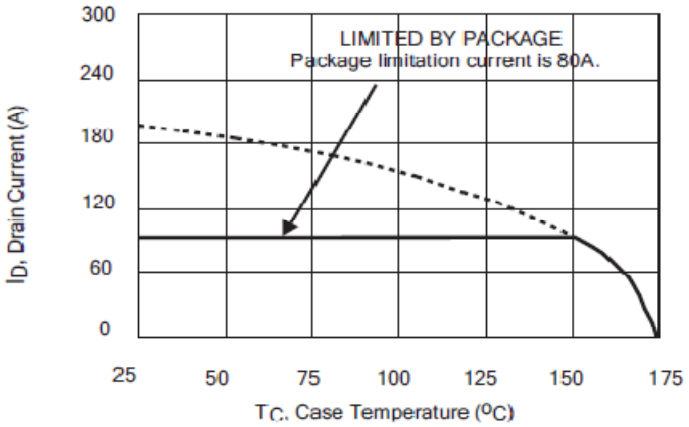


Figure 4. Typical Output Characteristics

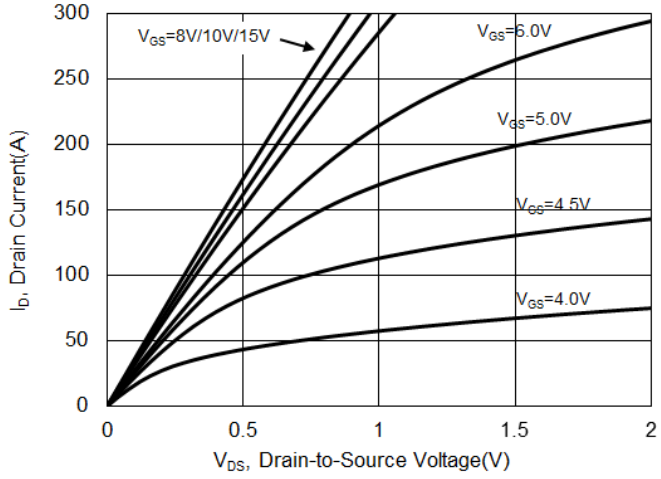
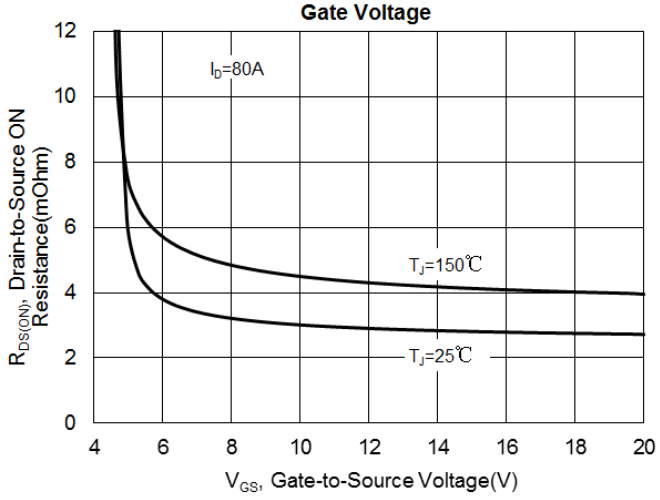


Figure 5. Typical Drain-to-Source ON Resistance vs. Gate Voltage



©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

Typical Characteristics(Cont.)

Figure 6. Maximum Peak Current Capability

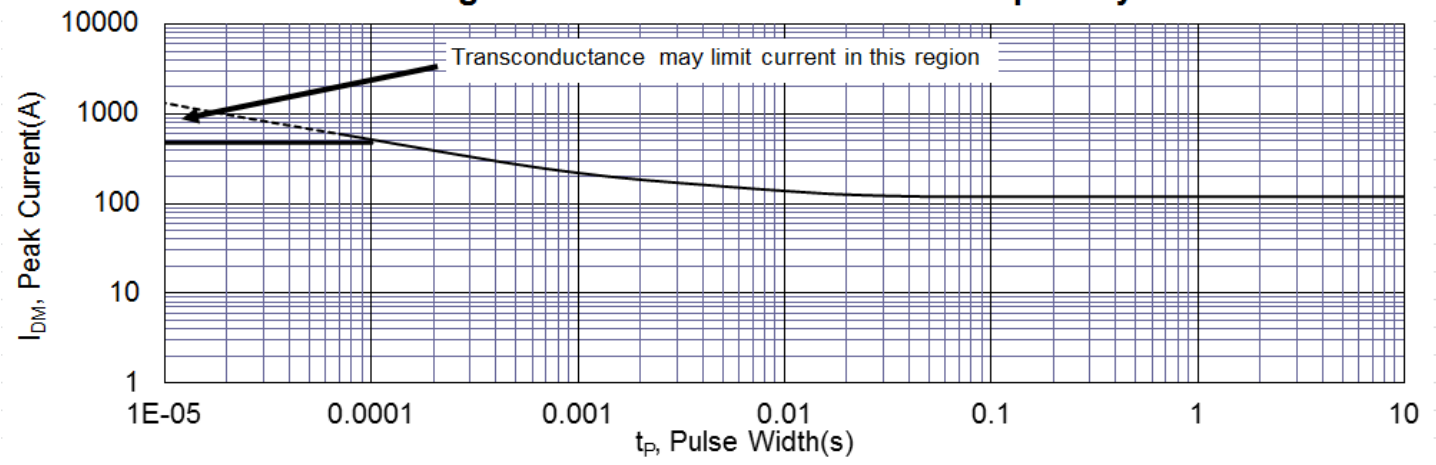


Figure 7. Typical Transfer Characteristics

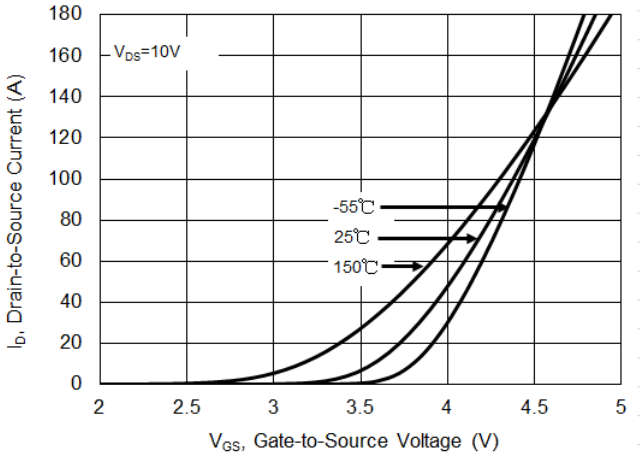


Figure 8. Unclamped Inductive Switching Capability

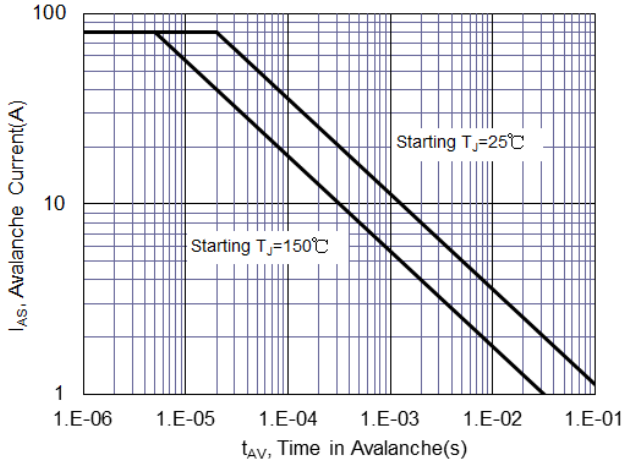


Figure 9. Typical Drain-to-Source ON Resistance

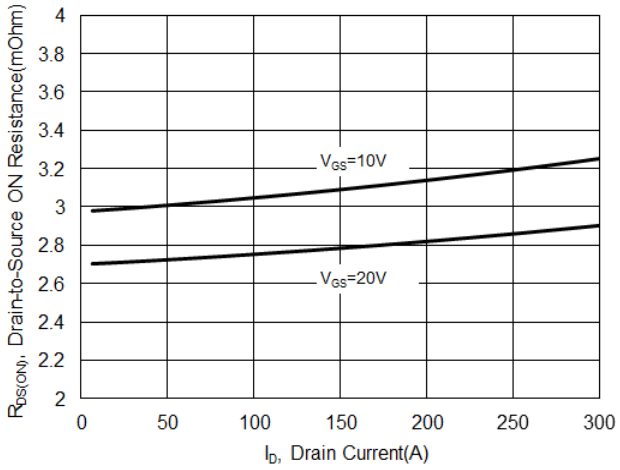
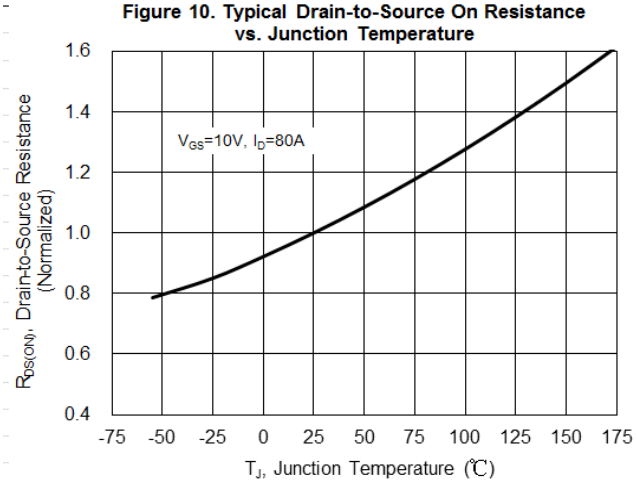


Figure 10. Typical Drain-to-Source On Resistance vs. Junction Temperature



©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

Figure 11.Typical Breakdown Voltage vs. Junction Temperature

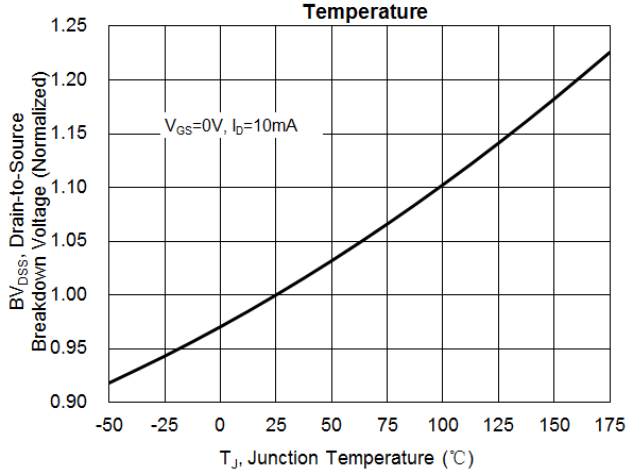


Figure 12.Typical Threshold Voltage vs. Junction Temperature

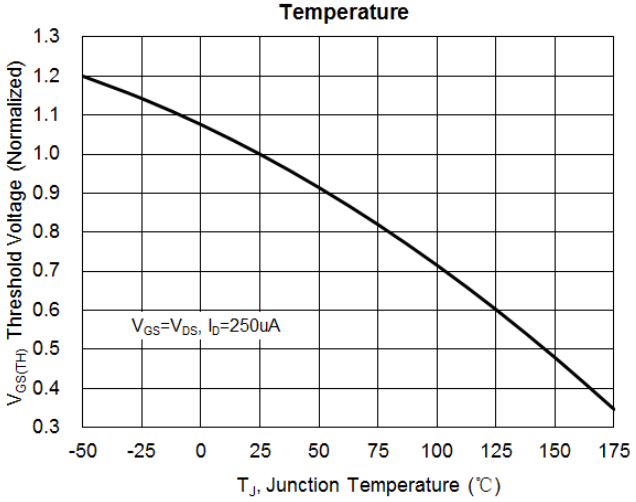


Figure 13. Maximum Forward Safe Operation Area

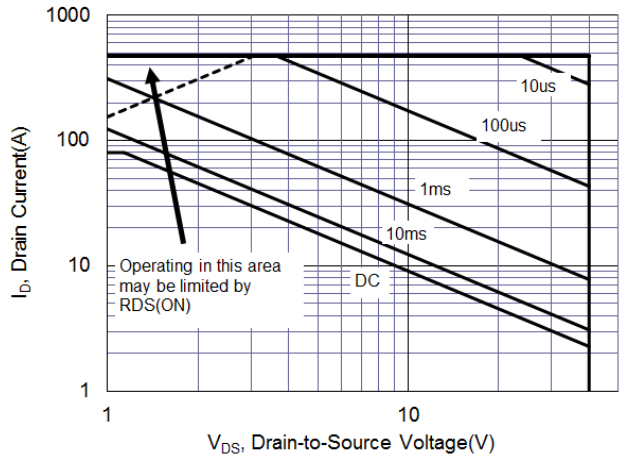


Figure 14. Typical Capacitance vs. Drain-to-Source Voltage

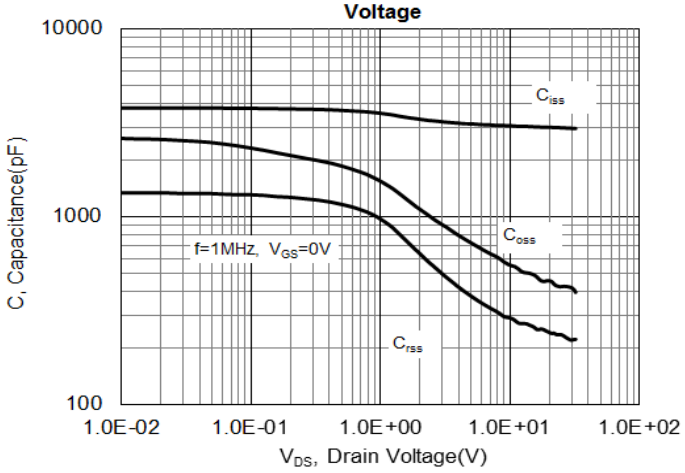


Figure 15. Typical Gate Charge vs. Gate-to-Source Voltage

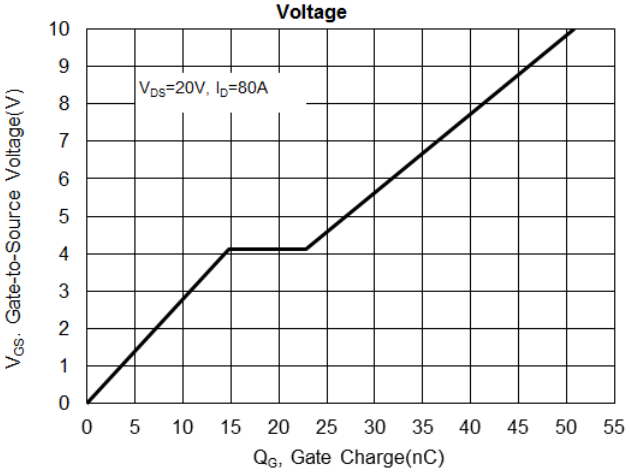
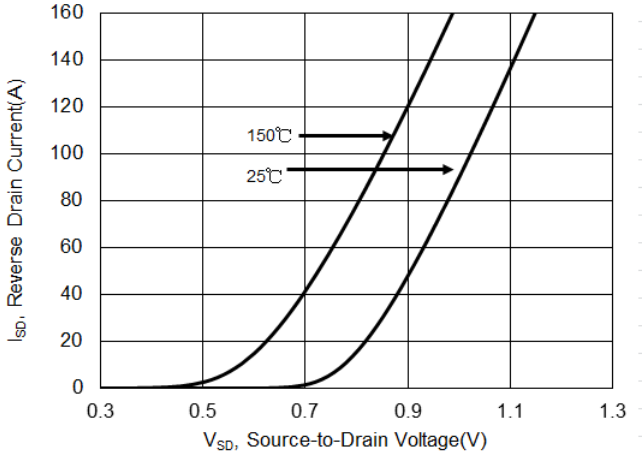


Figure 16. Typical Body Diode Transfer Characteristics



©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

Test Circuits and Waveforms

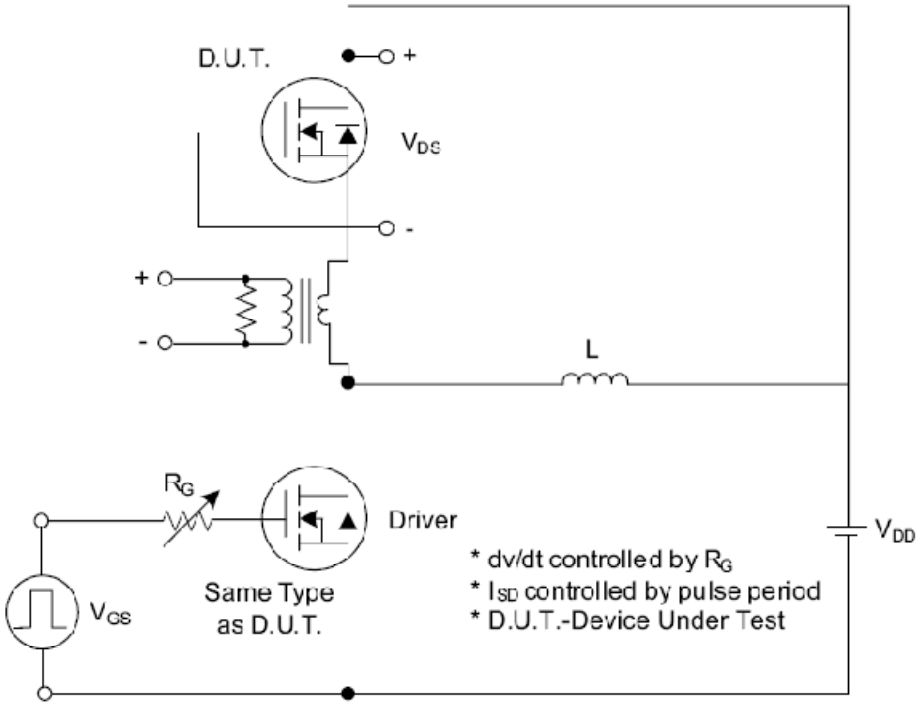


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

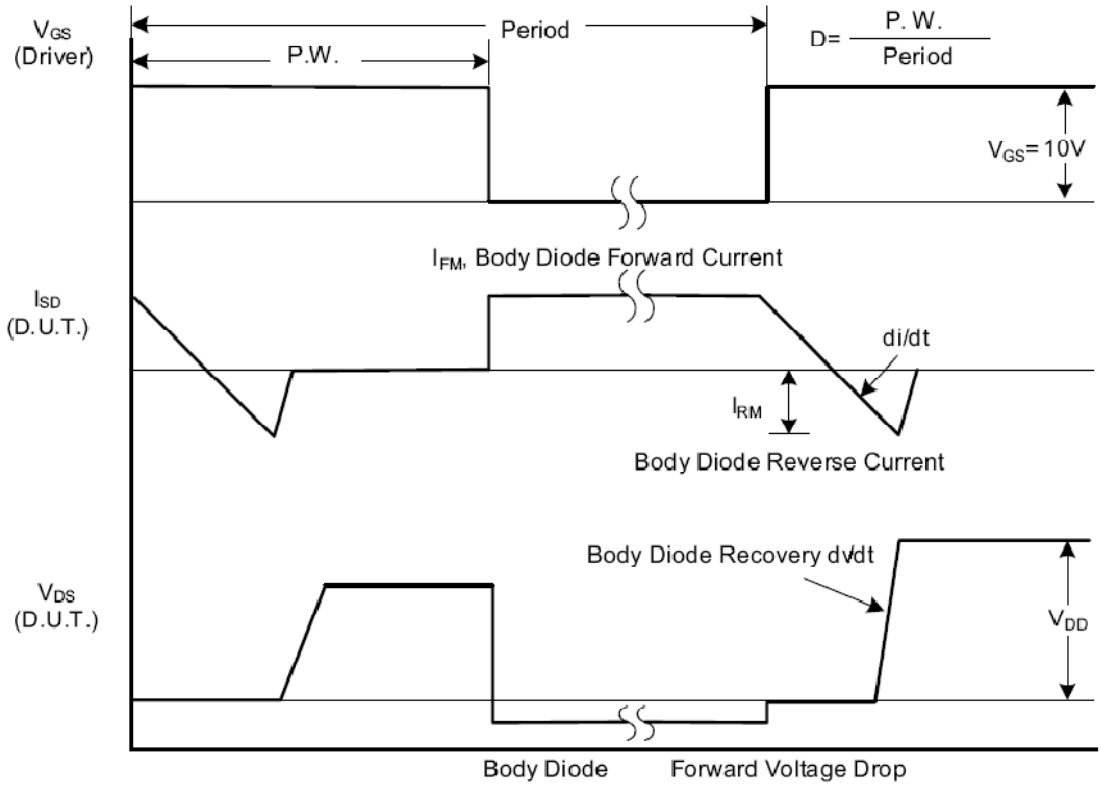


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

Test Circuits and Waveforms (Cont.)

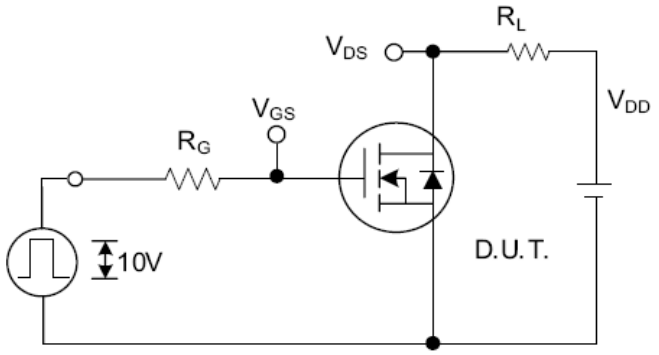


Fig. 2.1 Switching Test Circuit

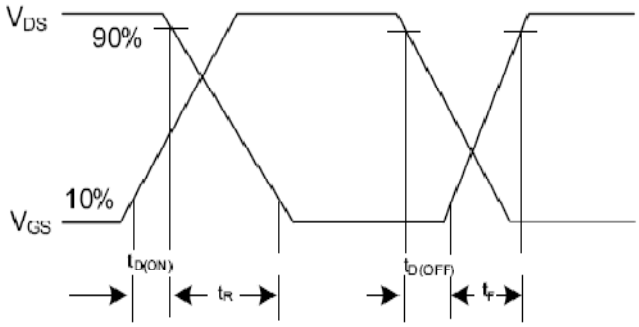


Fig. 2.2 Switching Waveforms

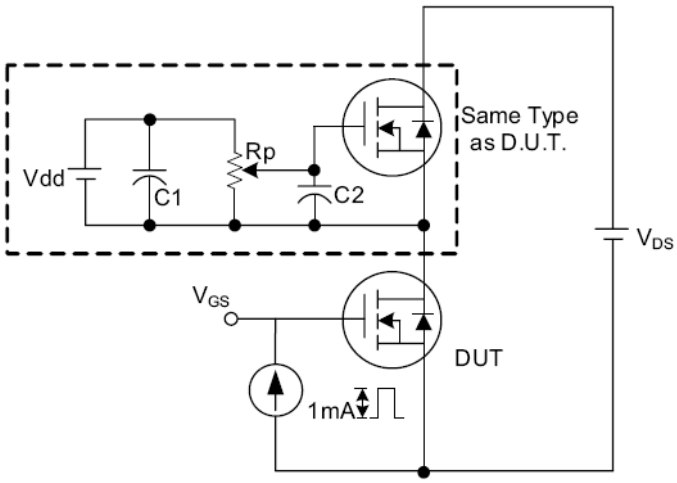


Fig. 3 . 1 Gate Charge Test Circuit

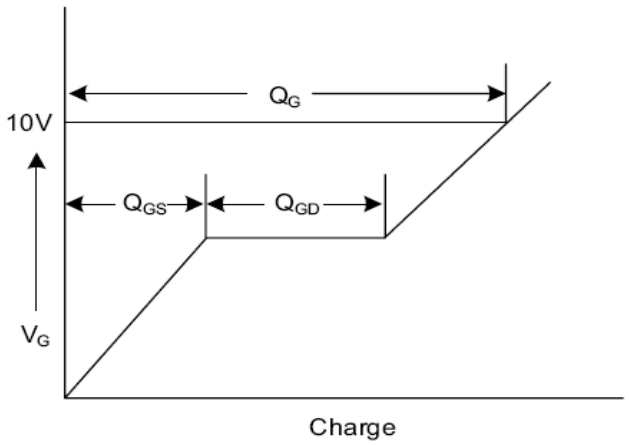


Fig. 3 . 2 Gate Charge Waveform

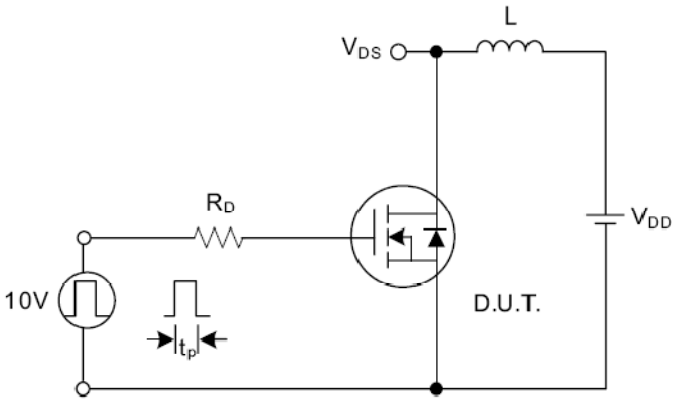


Fig. 4.1 Unclamped Inductive Switching Test Circuit

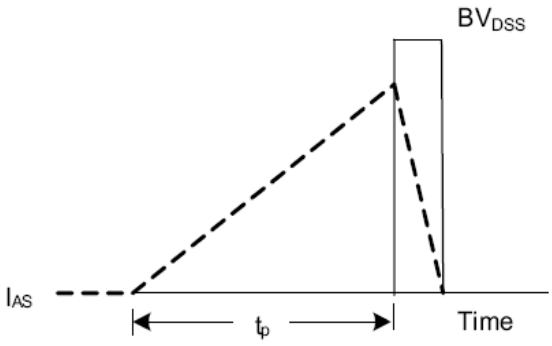


Fig. 4.2 Unclamped Inductive Switching Waveforms

©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

Disclaimers:

Perfect Intelligent Power Semiconductor Co., Ltd (PIP) reserves the right to make changes without notice in order to improve reliability, function or design and to discontinue any product or service without notice. Customers should obtain the latest relevant information before orders and should verify that such information is current and complete. All products are sold subject to PIP's terms and conditions supplied at the time of order acknowledgement.

Perfect Intelligent Power Semiconductor Co., Ltd warrants performance of its hardware products to the specifications at the time of sale, Testing, reliability and quality control are used to the extent PIP deems necessary to support this warrantee. Except where agreed upon by contractual agreement, testing of all parameters of each product is not necessarily performed.

Perfect Intelligent Power Semiconductor Co., Ltd does not assume any liability arising from the use of any product or circuit designs described herein. Customers are responsible for their products and applications using PIP's components. To minimize risk, customers must provide adequate design and operating safeguards.

Perfect Intelligent Power Semiconductor Co., Ltd does not warrant or convey any license either expressed or implied under its patent rights, nor the rights of others. Reproduction of information in PIP's data sheets or data books is permissible only if reproduction is without modification or alteration. Reproduction of this information with any alteration is an unfair and deceptive business practice. Perfect Intelligent Power Semiconductor Co., Ltd is not responsible or liable for such altered documentation.

Resale of PIP's products with statements different from or beyond the parameters stated by Perfect Intelligent Power Semiconductor Co., Ltd for that product or service voids all express or implied warrantees for the associated PIP's product or service and is unfair and deceptive business practice. Perfect Intelligent Power Semiconductor Co., Ltd is not responsible or liable for any such statements.

Life Support Policy:

Perfect Intelligent Power Semiconductor Co., Ltd's products are not authorized for use as critical components in life support devices or systems without the expressed written approval of Perfect Intelligent Power Semiconductor Co., Ltd.

As used herein:

1. Life support devices or systems are devices or systems which:
   a. are intended for surgical implant into the human body,
   b. support or sustain life,
   c. whose failure to perform when properly used in accordance with instructions for used provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

©2016 Perfect Intelligent Power Semiconductor Co., Ltd. All rights reserved. Information and data in this document are owned by PIP Semiconductors and may not be edited, reproduced, or redistributed in any way without written consent from PIP.

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.