



40V P-Channel MOSFETs

General Description

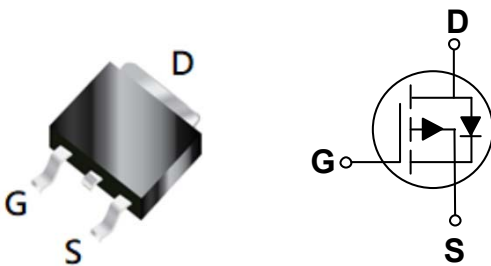
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BV_{DSS}	$R_{DS(ON)}$	I_D
-40 V	13 m Ω	-50 A

Features

- $R_{DS(ON)} \leq 13m\Omega @ V_{GS} = -10V$
- Fast Switching
- Green Device Available
- Improved dv/dt Capability

TO-252 Pin Configuration



Applications

- Power Management Switches
- DC/DC Converters

Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous ($T_C=25^\circ C$)	-50	A
I_{DM}	Drain Current - Pulsed (NOTE 1)	-200	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	80	mJ
P_D	Power Dissipation ($T_C=25^\circ C$)	55	W
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
Marking Code		PD013	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	61	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to Case	2.27	$^\circ C/W$

**Electrical Characteristics (T_J=25°C, unless otherwise noted)****Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V , I _D = -250uA	-40	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} = -40V , V _{GS} = 0V	---	---	-1	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ±20V , V _{DS} = 0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = -10V , I _D = -16A	---	---	13	mΩ
		V _{GS} = -4.5V , I _D = -12A	---	---	20	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D = -250uA	-1.0	---	-2.5	V
g _{fs}	Forward Transconductance	V _{DS} = -10V , I _D = -16A	---	44	---	S

Dynamic and switching Characteristics (NOTE 4)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q _g	Total Gate Charge	V _{DS} = -20V , V _{GS} = -10V , I _D = -16A	---	28	---	nC
Q _{gs}	Gate-Source Charge		---	8	---	
Q _{gd}	Gate-Drain Charge		---	8.5	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} = -15V , V _{GS} = -10V , R _G = 3Ω , I _D = -16A	---	38	---	ns
T _r	Rise Time		---	31	---	
T _{d(off)}	Turn-Off Delay Time		---	90	---	
T _f	Fall Time		---	9.2	---	
C _{iss}	Input Capacitance	V _{DS} = -20V , V _{GS} = 0V , F= 1MHz	---	3050	---	pF
C _{oss}	Output Capacitance		---	282	---	
C _{rss}	Reverse Transfer Capacitance		---	230	---	
R _g	Gate resistance	V _{GS} = 0V , V _{DS} = 0V , F=1MHz	---	9	---	Ω

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G = V _D = 0V , Force Current	---	---	-50	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0V , I _S = -1A	---	---	-1.2	V

NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-40A.
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
4. This value is guaranteed by design hence it is not included in the production test.



Characteristics Curves

FIG. 1-Output Characteristics

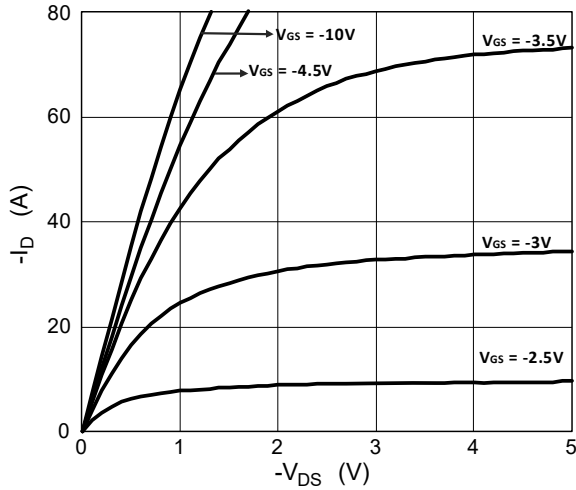


FIG. 2-Transfer Characteristics

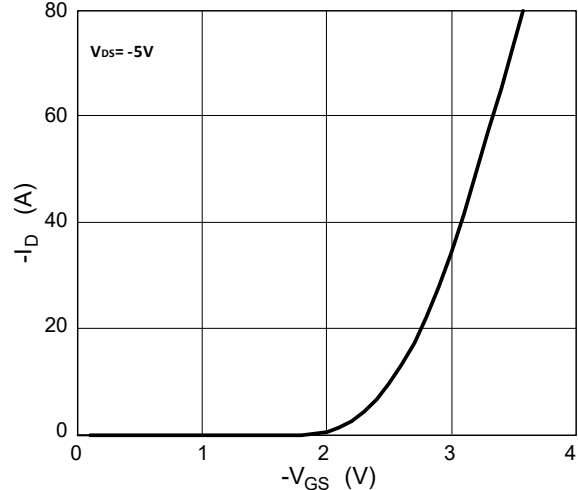


FIG. 3- I_S vs V_{SD}

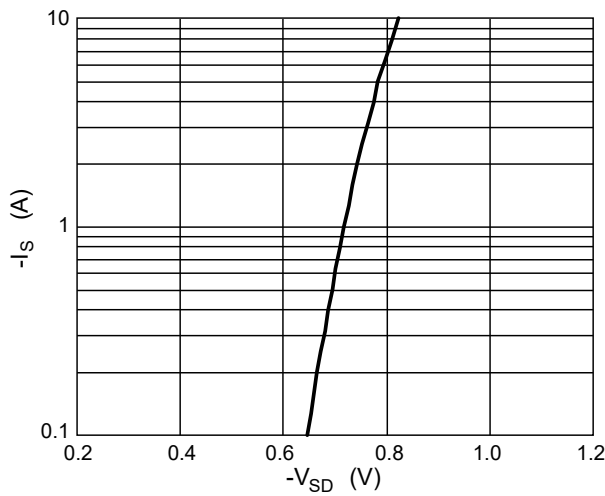


FIG. 4- $R_{DS(ON)}$ vs I_D

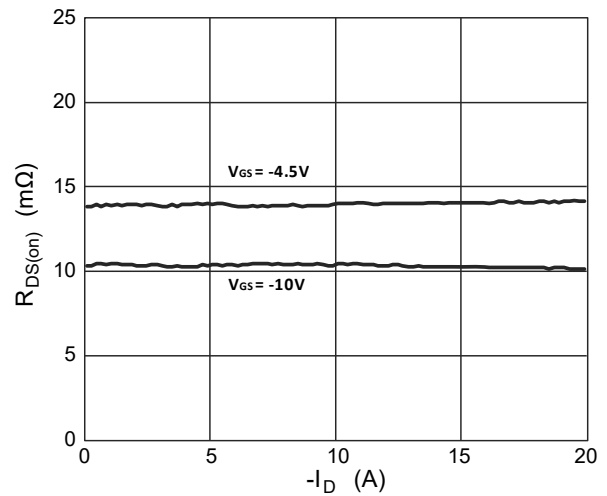


FIG. 5-Normalized $R_{DS(ON)}$ vs T_J

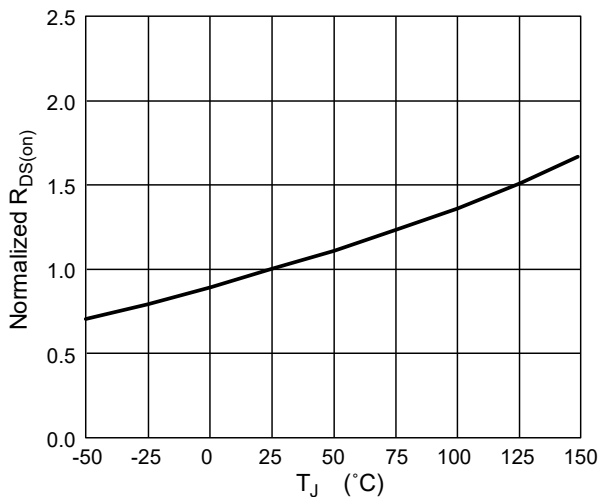
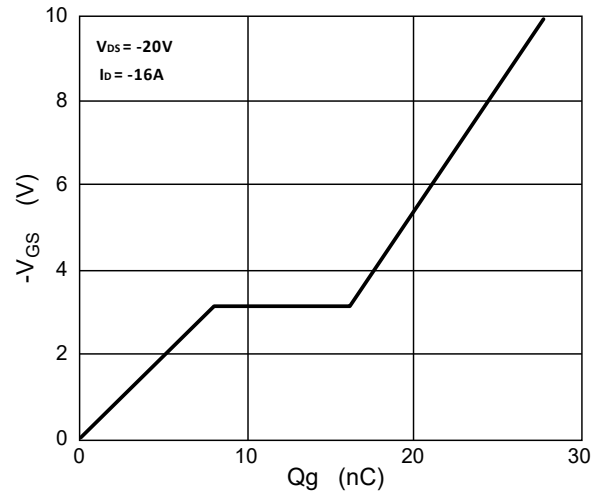


FIG. 6-Gate Charge Characteristics





Characteristics Curves

FIG. 7-Safe Operation Area

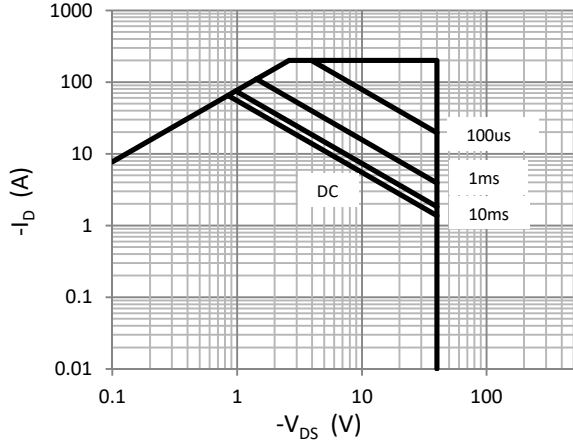


FIG. 8 - Switching Time Waveform

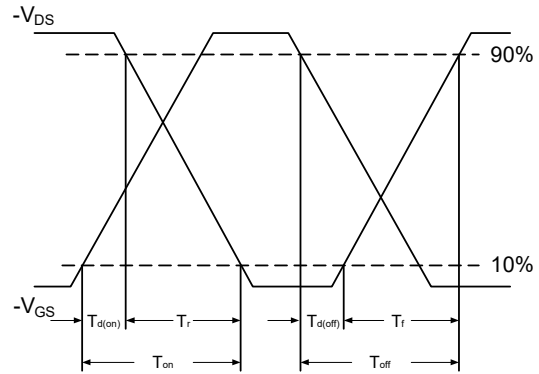
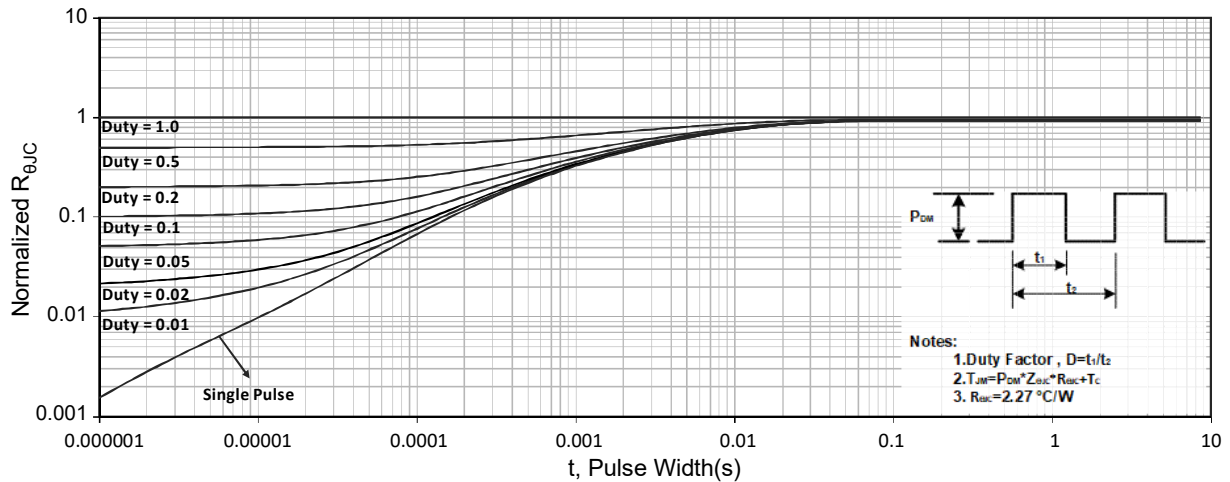
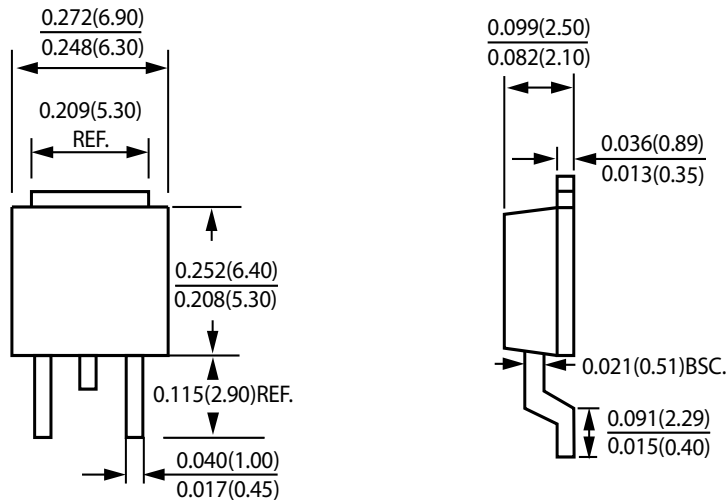


FIG. 9-Normalized Transient Impedance



Package Outline Dimensions



TO-252

Dimensions in inches and (millimeters)



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