TGD N-Channel Enhancement Mode Power MOSFET

Description

The TGD2010E uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications .It is ESD protested.

General Features

- V_{DS} = 20V,I_D =7A

    $R_{DS(ON)}$ < 27mΩ @ V_{GS}=2.5V

    $R_{DS(ON)}$ < 21mΩ @ V_{GS}=4.5V

    ESD Rating: 2000V HBM
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- PWM application
- Load switch
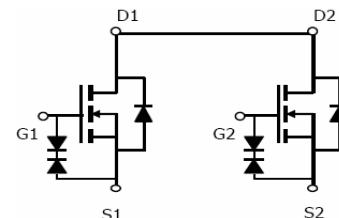
Schematic diagram
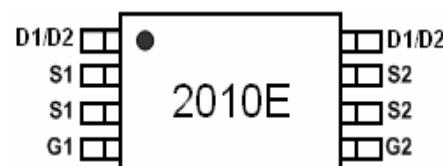
pin assignment
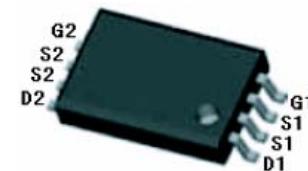
TSSOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2010E	TGD2010E	TSSOP-8	Ø330mm	12mm	3000 units

Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	7	A
Drain Current-Pulsed [Note 1]	I_{DM}	30	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	83.3	℃/W

Electrical Characteristics (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250µA	20	21.5	23	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V	-	-	1	µA

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm10V, V_{DS}=0V$	-	-	±10	µA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250µA$	0.5	0.65	0.9	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=6.5A$	-	15	21	mΩ
		$V_{GS}=2.5V, I_D=5.5A$	-	20	27	mΩ
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=7A$	-	20	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{Iss}		-	1150	-	PF
Output Capacitance	C_{oss}	$V_{DS}=10V, V_{GS}=0V,$	-	185	-	PF
Reverse Transfer Capacitance	C_{rss}	$F=1.0MHz$				
			-	145	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, R_L=1.35\Omega$	-	6		nS
Turn-on Rise Time	t_r		-	13		nS
Turn-Off Delay Time	$t_{d(off)}$	$V_{GS}=5V, R_{GEN}=3\Omega$	-	52		nS
Turn-Off Fall Time	t_f		-	16		nS
Total Gate Charge	Q_g	$V_{DS}=10V, I_D=7A,$	-	15		nC
Gate-Source Charge	Q_{gs}	$V_{GS}=4.5V$	-	0.8	-	nC
Gate-Drain Charge	Q_{gd}		-	3.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	7	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. Surface Mounted on FR4 Board, t ≤ 10 sec.

3. Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

## Typical Electrical and Thermal Characteristics
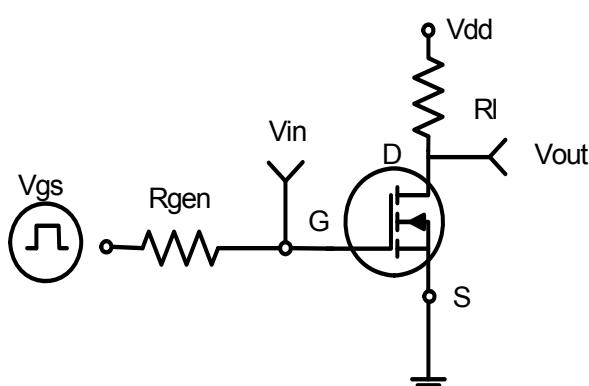
Figure 1:Switching Test Circuit
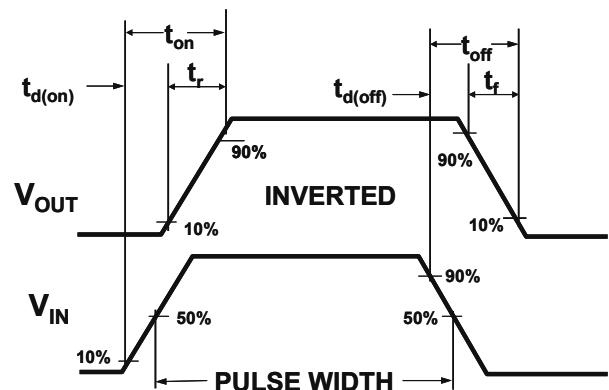
Figure 2:Switching Waveforms
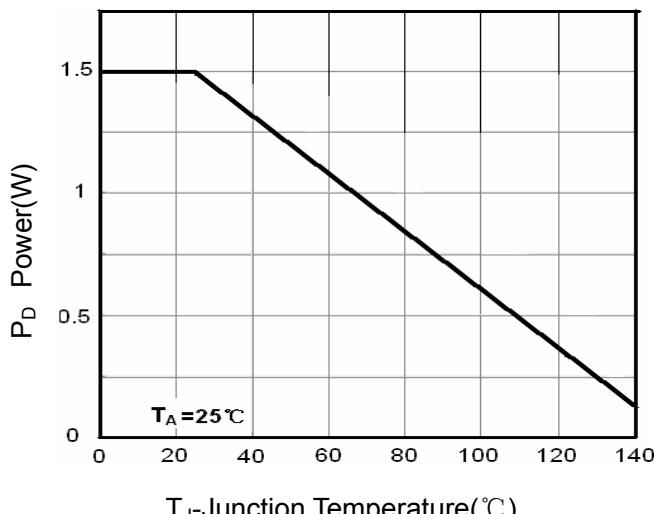
Figure 3 Power Dissipation
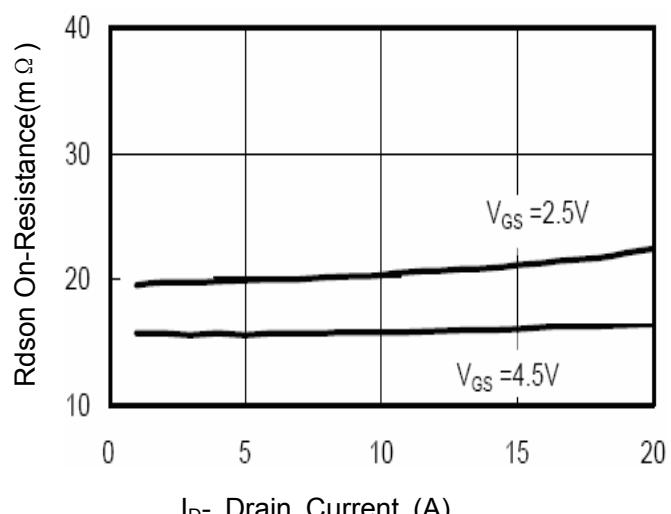
**Figure 6 Drain-Source On-Resistance**
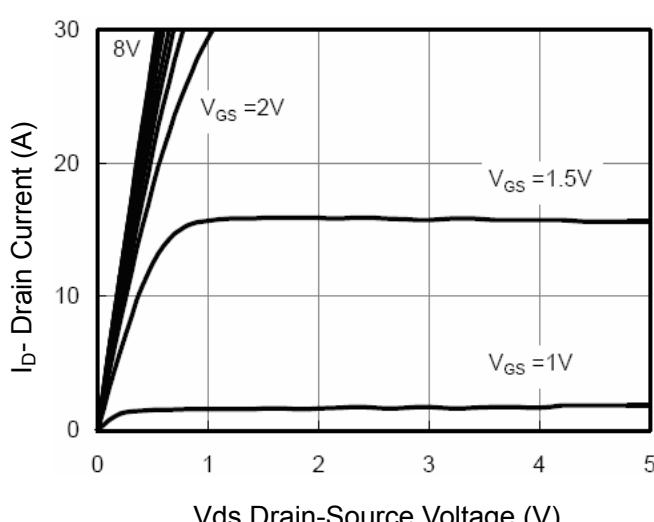
Figure 5 Output Characteristics
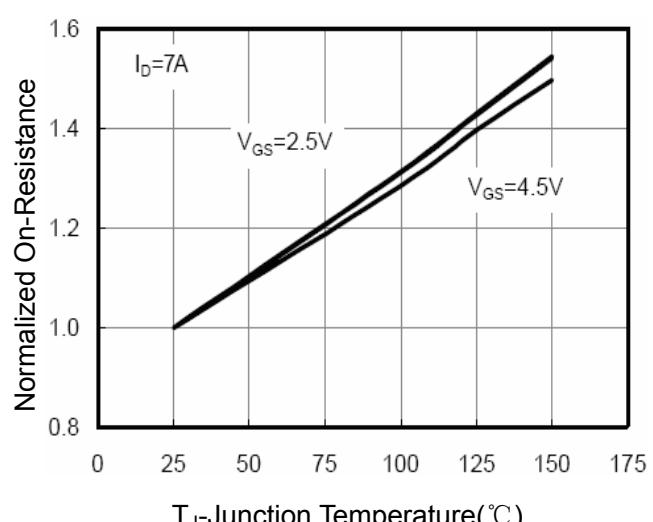
Figure 8 Drain-Source On-Resistance
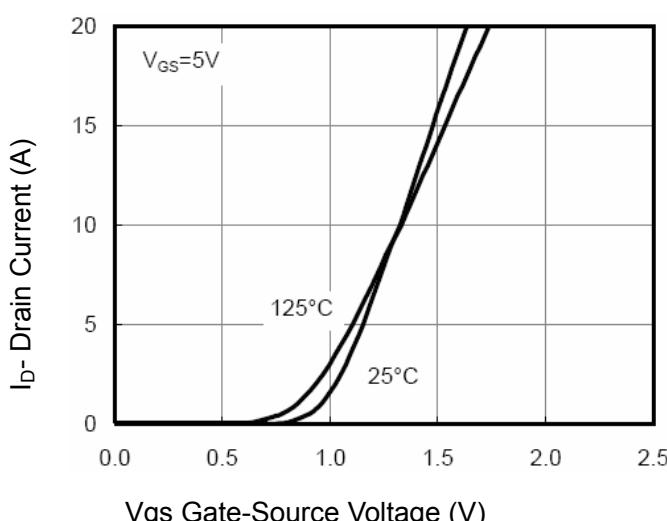
Figure 7 Transfer Characteristics
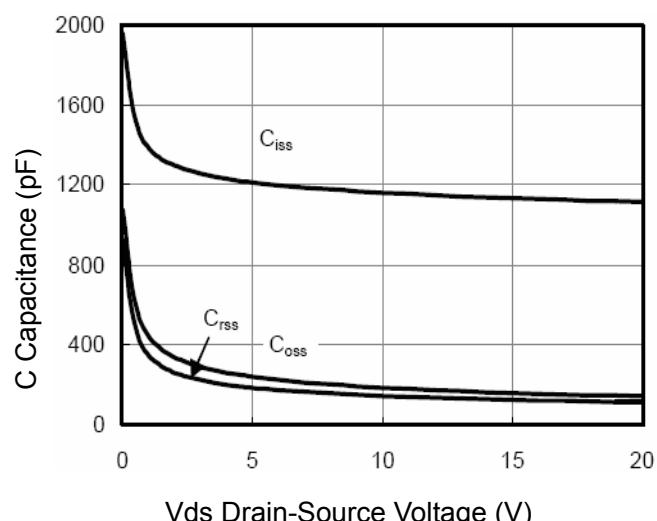
Figure 8 Capacitance vs Vds
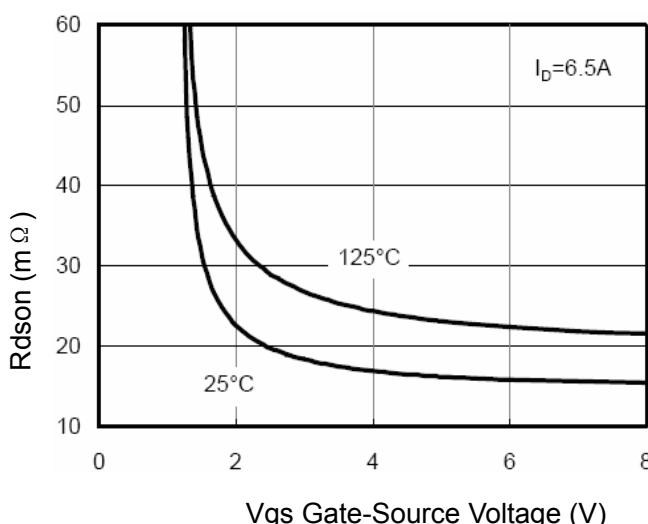
Figure 9 Rdson vs Vgs
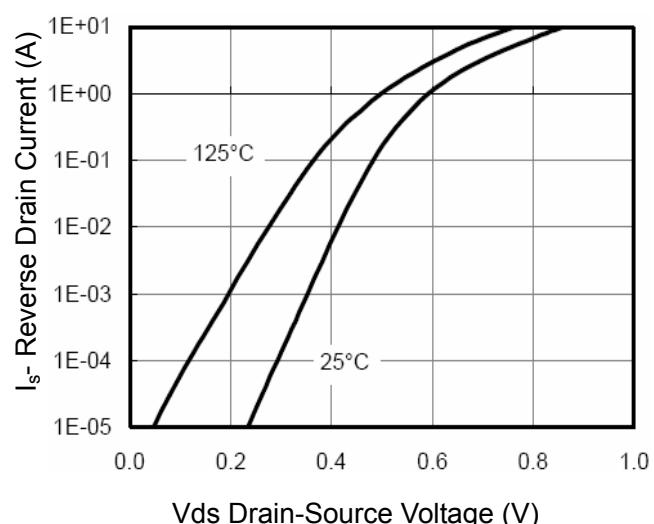
Figure 10 Capacitance vs Vds
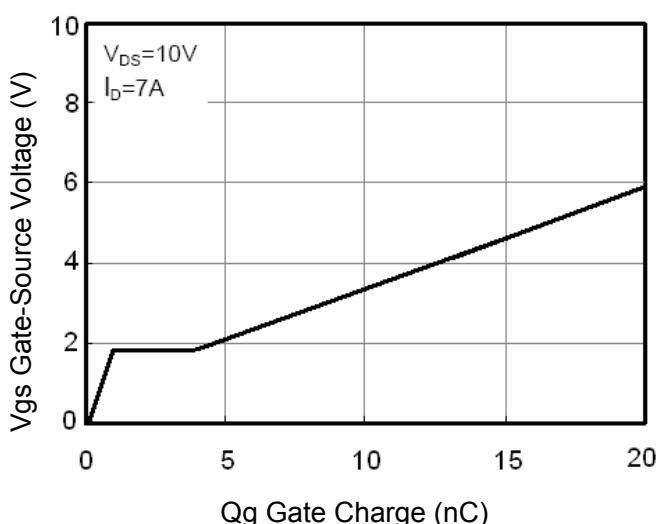
**Figure 11 Gate Charge**
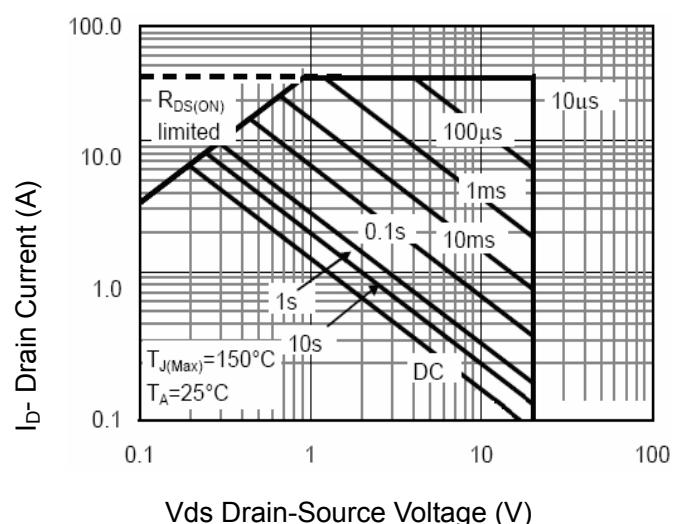
Figure 13 Safe Operation Area
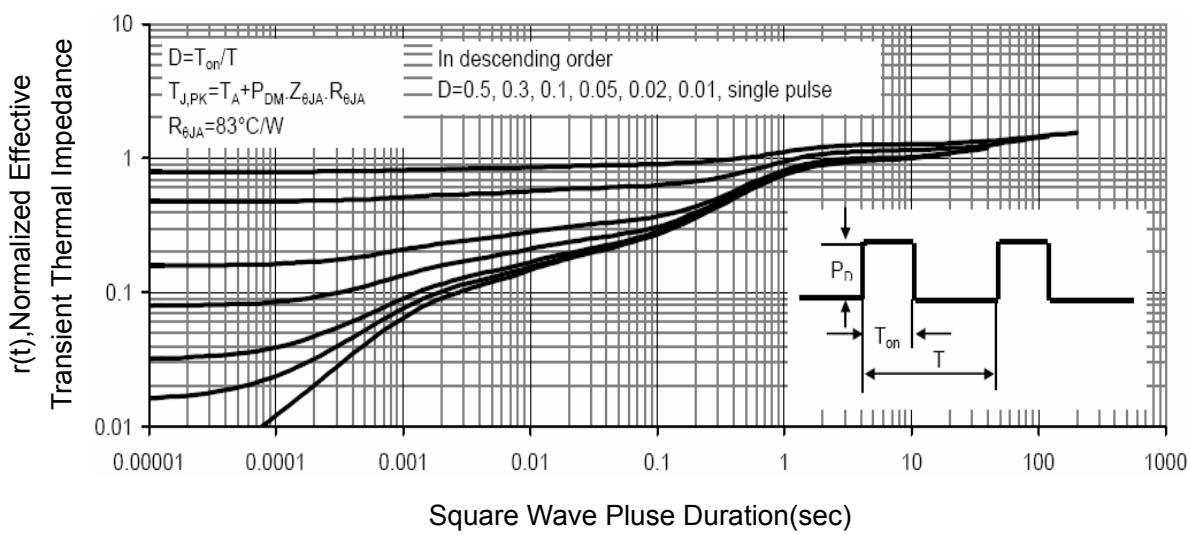
**Figure 14 Normalized Maximum Transient Thermal Impedance**

Tssop-8 Package Information
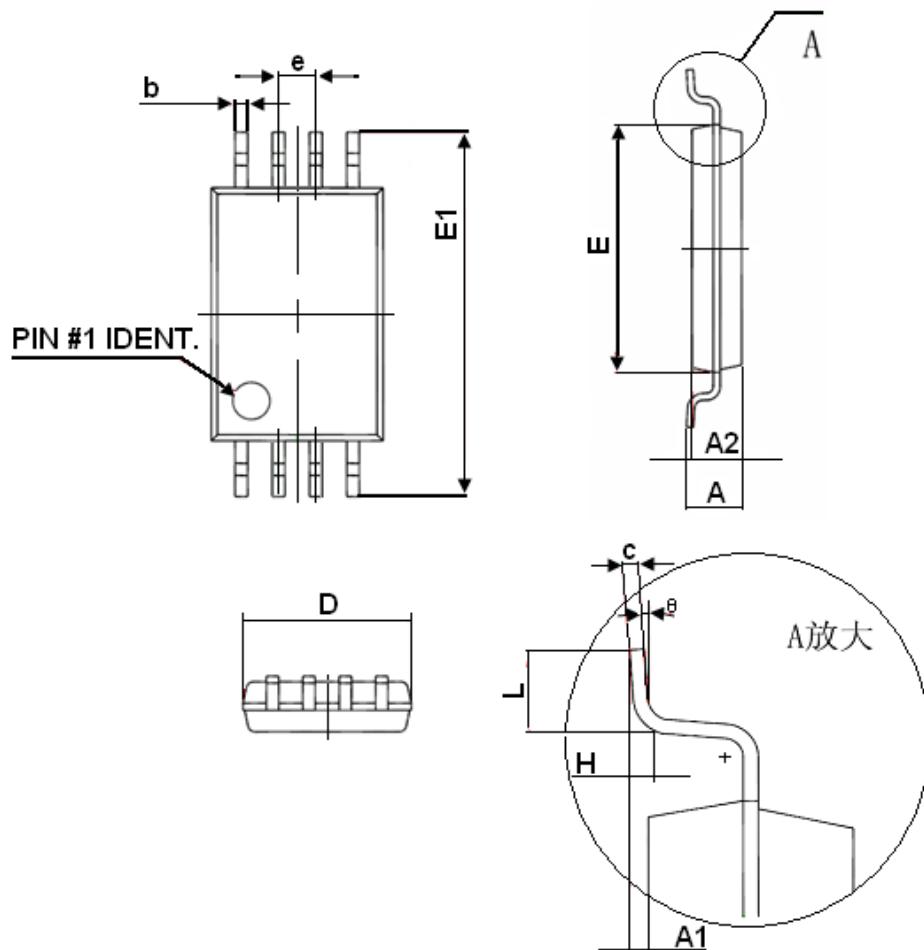
Symbol	Dimensions In Millimeters	
	Min	Max
D	2.900	3.100
E	4.300	4.500
b	0.190	0.300
c	0.090	0.200
E1	6.250	6.550
A		1.100
A2	0.800	1.000
A1	0.020	0.150
e	0.65(BSC)	
L	0.500	0.700
H	0.25(TYP)	
Θ	1°	7°