

## Features

- 250V/82A,  
 $R_{DS(ON)} = 28m\Omega(Typ.)@V_{GS}=10V$
- Low  $R_{DS(ON)}$
- Planar Technology
- Reliable and Rugged
- 100% Avalanche Tested
- 100% Rg Tested

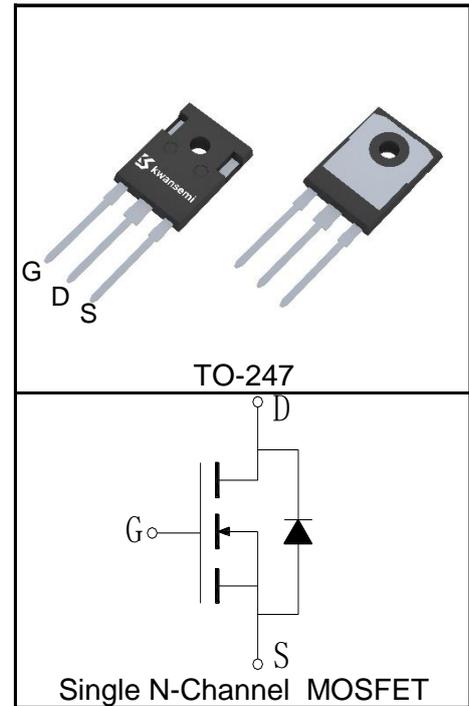
## Applications

- DC-DC Converters and Off-line UPS
- Power Management in Inverter System



Halogen-Free

## Pin Description



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> ( $T_C=25^\circ\text{C}$ Unless Otherwise Noted)			
$V_{DSS}$	Drain-Source Voltage	250	V
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	
$T_{Jmax}$	Maximum Junction Temperature	175	$^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 175	$^\circ\text{C}$
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ 82	A
<b>Mounted on Large Heat Sink</b>			
$I_{DP}^{①}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C=25^\circ\text{C}$ 328	A
$I_D^{②}$	Continuous Drain Current( $V_{GS}=10V$ )	$T_C=25^\circ\text{C}$ 82	A
		$T_C=100^\circ\text{C}$ 58	
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 681	W
		$T_C=100^\circ\text{C}$ 340	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.22	$^\circ\text{C/W}$
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	50	$^\circ\text{C/W}$
<b>Drain-Source Avalanche Ratings</b>			
$E_{AS}^{④}$	Avalanche Energy, Single Pulsed	2756	mJ

**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  Unless Otherwise Noted)

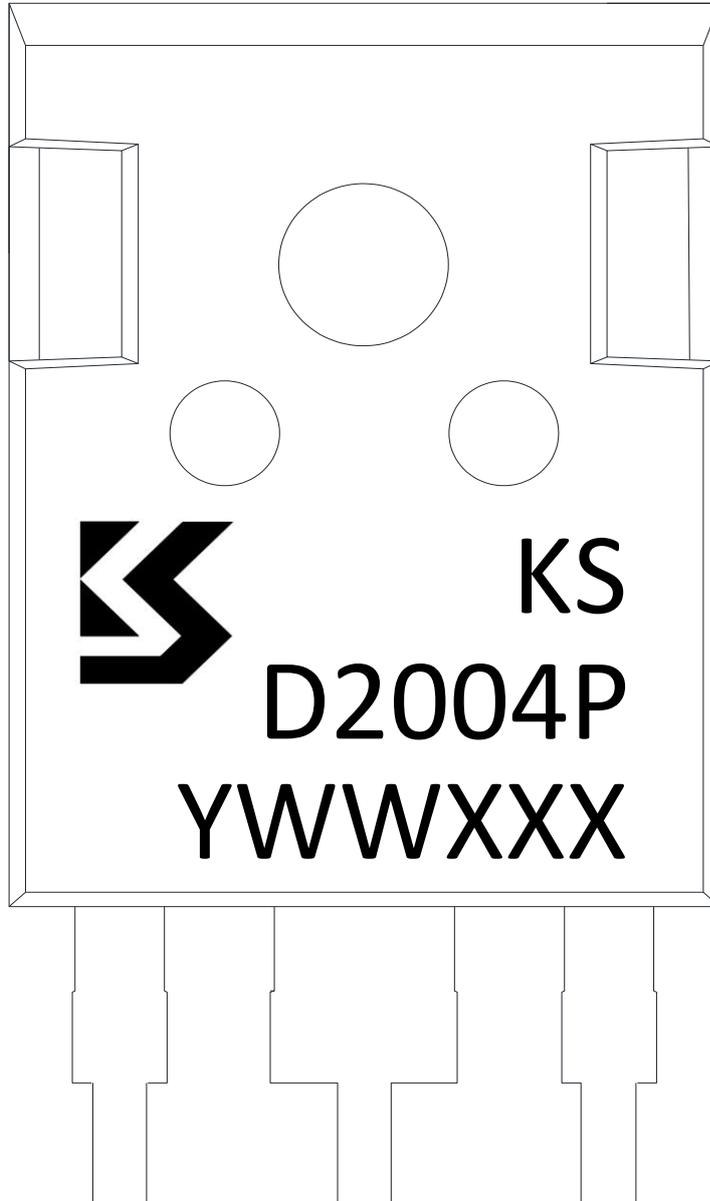
Symbol	Parameter	Test Condition	KSD2004PAP			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	250			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=250V, V_{GS}=0V$			1	$\mu A$
		$T_J=125^\circ\text{C}$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2	3	4	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$			$\pm 100$	nA
$R_{DS(ON)}^{(5)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=40A$		28	35	$m\Omega$
		$V_{GS}=6V, I_{DS}=20A$		30	40	$m\Omega$
<b>Diode Characteristics</b>						
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=40A, V_{GS}=0V$		0.83	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=40A, dI_{SD}/dt=100A/\mu s$		305		ns
$Q_{rr}$	Reverse Recovery Charge			1940		nC
<b>Dynamic Characteristics<sup>(6)</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.3		$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=125V,$ Frequency=1.0MHz		5445		pF
$C_{oss}$	Output Capacitance			370		
$C_{rss}$	Reverse Transfer Capacitance			215		
$t_{d(ON)}$	Turn-on Delay Time			55		
$t_r$	Turn-on Rise Time	$V_{DD}=125V, I_{DS}=40A,$ $V_{GEN}=10V, R_G=6\Omega$		109		
$t_{d(OFF)}$	Turn-off Delay Time			127		
$t_f$	Turn-off Fall Time			88		
<b>Gate Charge Characteristics<sup>(6)</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=125V, V_{GS}=10V,$ $I_{DS}=40A$		386		nC
$Q_{gs}$	Gate-Source Charge			24		
$Q_{gd}$	Gate-Drain Charge			215		

**Notes:**

- ① Pulse width limited by safe operating area.
- ② Calculated continuous current based on maximum allowable junction temperature.
- ③ When mounted on 1 inch square copper board,  $t \leq 10\text{sec}$ . The value in any given application depends on the user's specific board design.
- ④ Limited by  $T_{Jmax}$ , Starting  $T_J = 25^\circ\text{C}$ ,  $I_{ASmax} = 105A$ ,  $L = 0.5\text{mH}$ ,  $V_{DD} = 80V$ ,  $R_G = 25\Omega$ ,  $V_{GS} = 10V$ . Part not recommended for use above this value. 100% Final Test at  $I_{AS} = 76A$ ,  $L = 0.5\text{mH}$ .
- ⑤ Pulse test; Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- ⑥ Guaranteed by design, not subject to production testing.

**Ordering and Marking Information**

Device	Package	Packaging	Quantity	Reel Size	Tape width
KSD2004PAP	TO-247	Tube	30	-	-

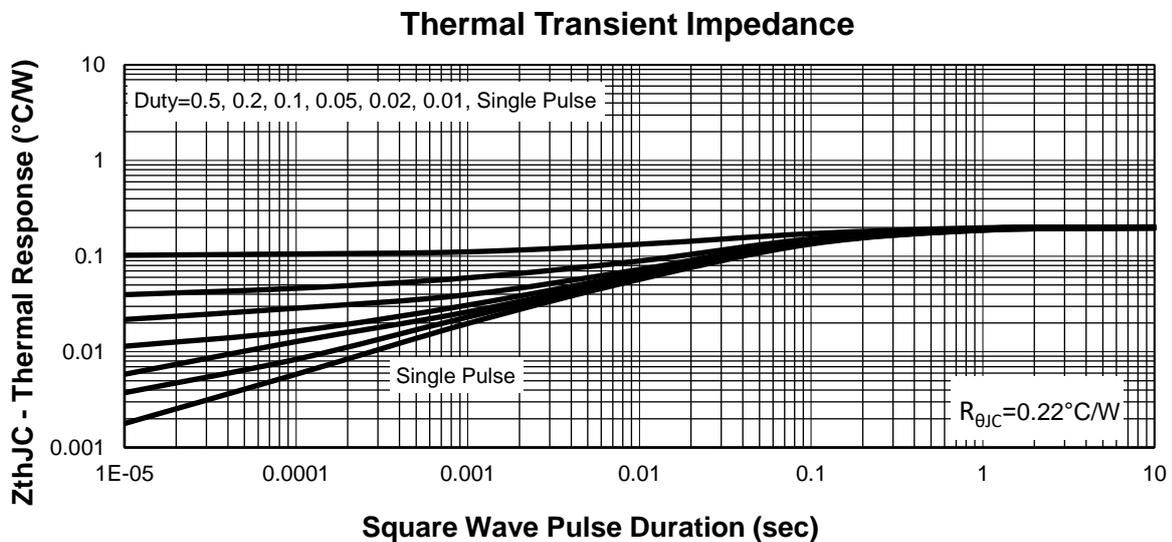
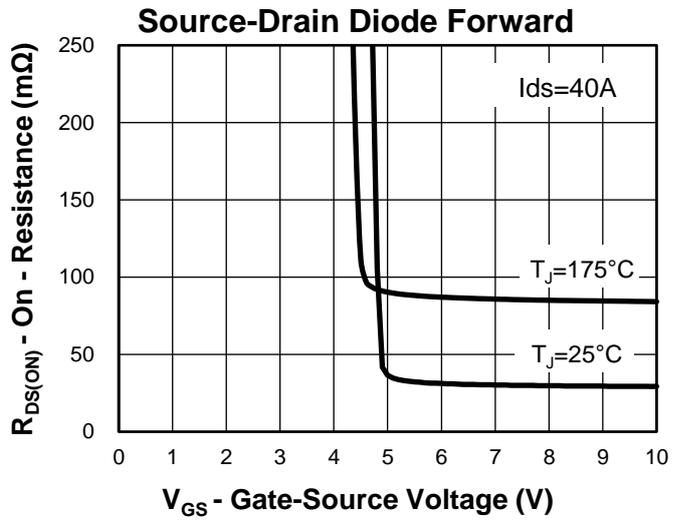
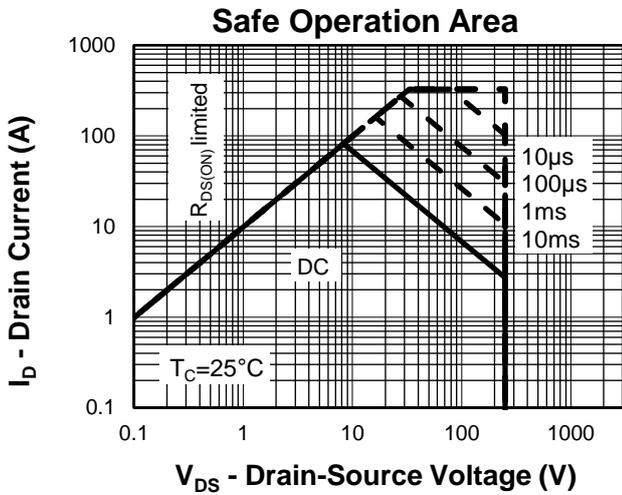
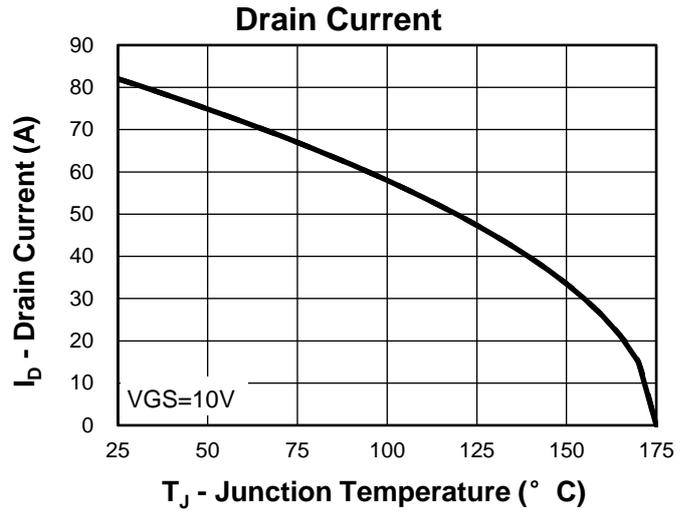
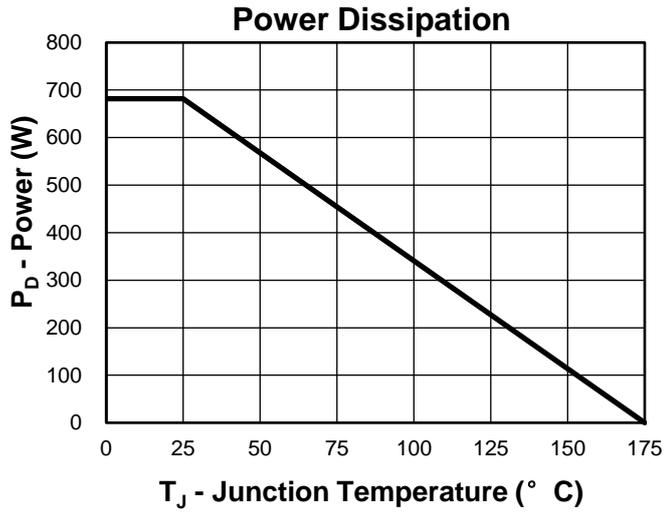


1st Line: Kwansemi LOGO, Kwansemi Code(KS)

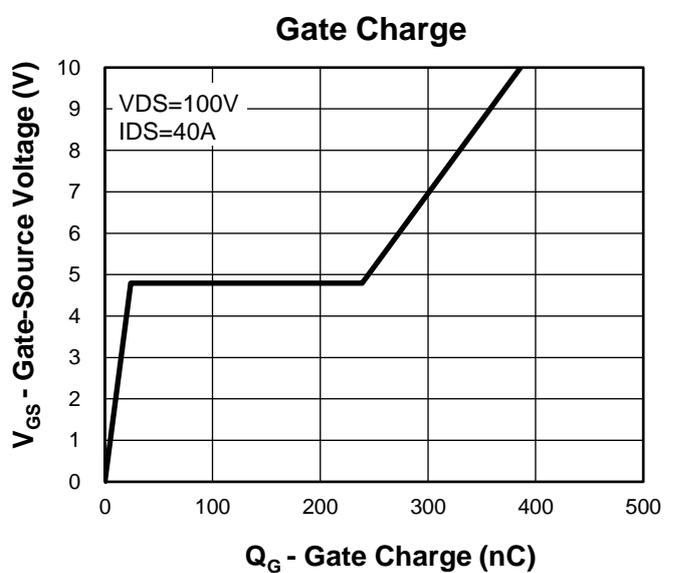
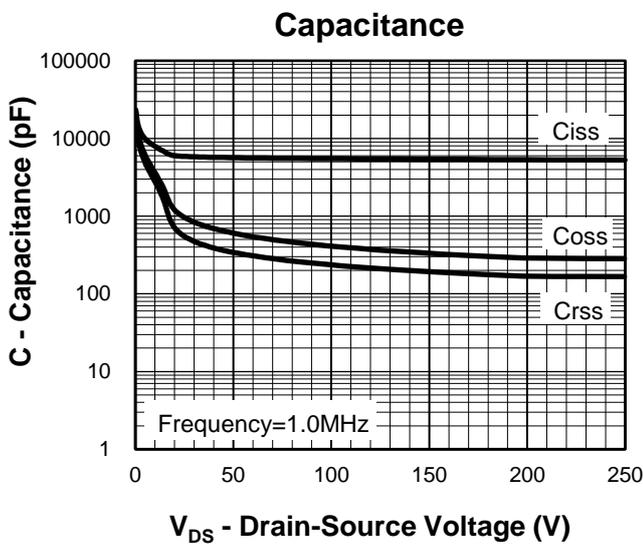
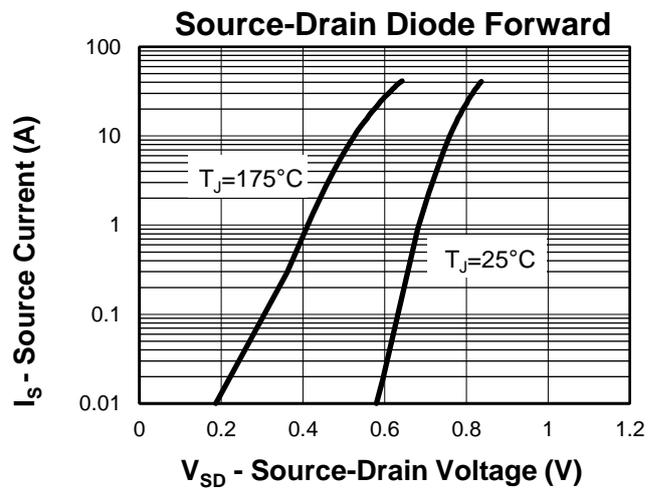
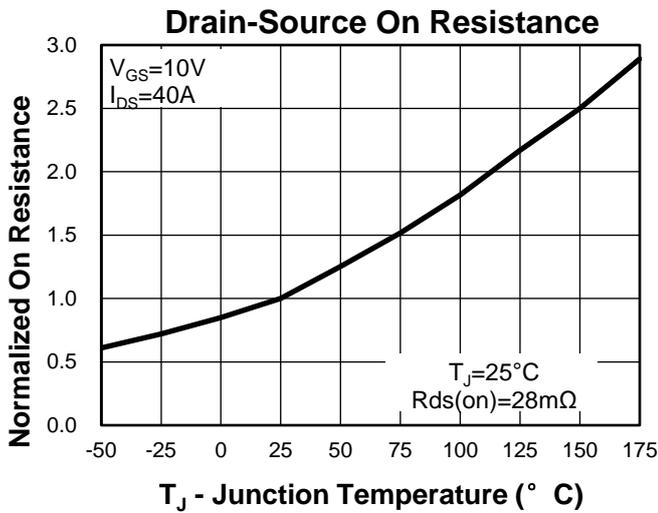
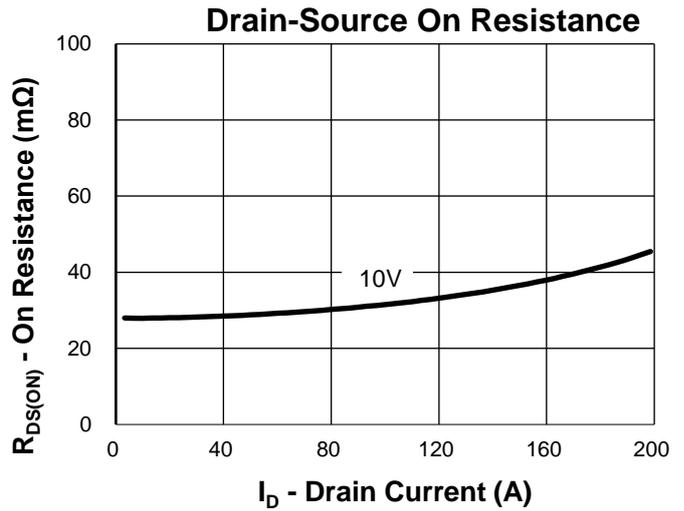
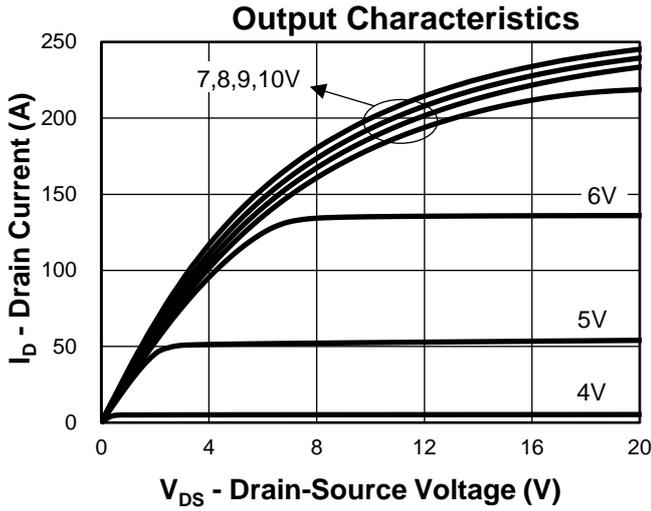
2nd Line: Part Number(D2004P)

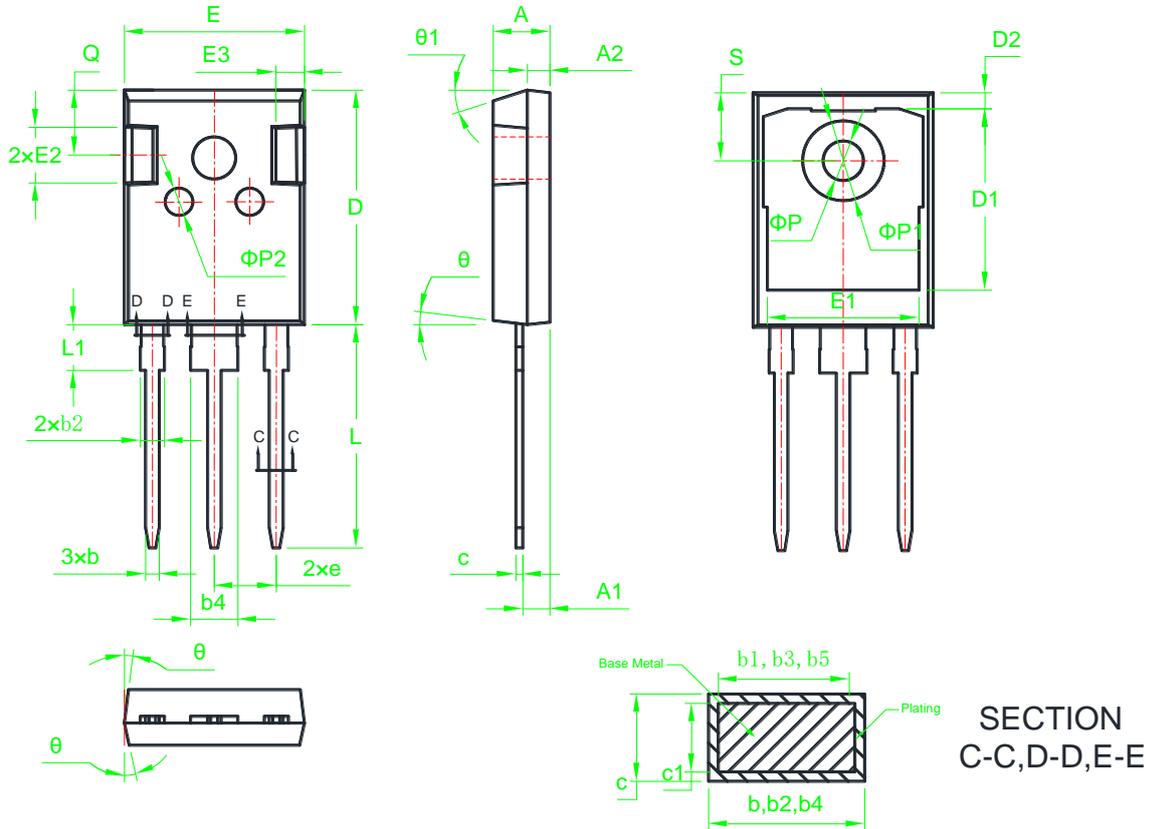
3rd Line: Lot Number(YWWXXX)

### Typical Characteristics



Typical Characteristics

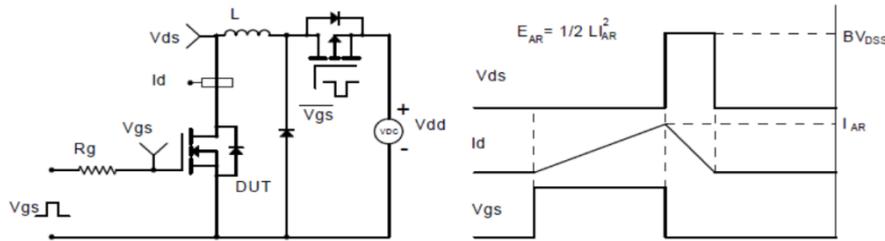


**Package Information**
**TO-247**

**SECTION  
C-C,D-D,E-E**

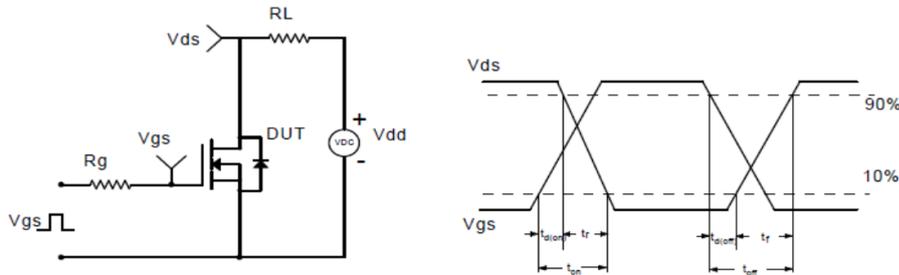
SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	4.90	5.00	5.10	0.193	0.197	0.201	E	15.70	15.80	15.90	0.618	0.622	0.626
A1	2.31	2.41	2.51	0.091	0.095	0.099	E1	13.10	13.30	13.50	0.516	0.524	0.531
A2	1.90	2.00	2.10	0.075	0.079	0.083	E2	4.90	5.00	5.10	0.193	0.197	0.201
b	1.16	1.21	1.26	0.046	0.048	0.050	E3	2.40	2.50	2.60	0.094	0.098	0.102
b1	1.15	1.20	1.25	0.045	0.047	0.049	e	5.44BSC			0.214BSC		
b2	1.95	2.10	2.15	0.077	0.083	0.085	L	19.80	19.92	20.10	0.780	0.784	0.791
b3	1.94	2.09	2.14	0.076	0.082	0.084	L1	*	*	4.30	*	*	0.169
b4	3.10	3.15	3.20	0.122	0.124	0.126	Q	5.60	5.80	6.00	0.220	0.228	0.236
b5	3.09	3.14	3.19	0.122	0.124	0.126	S	6.05	6.15	6.25	0.238	0.242	0.246
c	0.59	0.61	0.66	0.023	0.024	0.026	ØP	3.50	3.60	3.70	0.138	0.142	0.146
c1	0.58	0.60	0.65	0.023	0.024	0.026	ØP1	7.00	7.20	7.40	0.276	0.283	0.291
D	20.90	21.00	21.10	0.823	0.827	0.831	ØP2	2.40	2.50	2.60	0.094	0.098	0.102
D1	16.25	16.55	16.85	0.640	0.652	0.663	θ	5°	7°	9°	5°	7°	9°
D2	1.05	*	1.35	0.041	*	0.053	θ 1	13°	16°	19°	13°	16°	19°

Note: Dimensions do not inclusive burrs and mold flash.

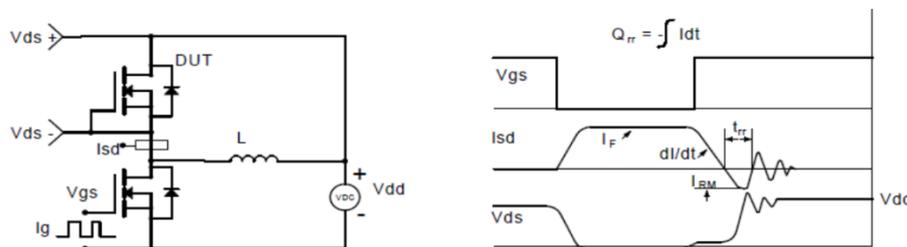
### Avalanche Test Circuit and Waveforms



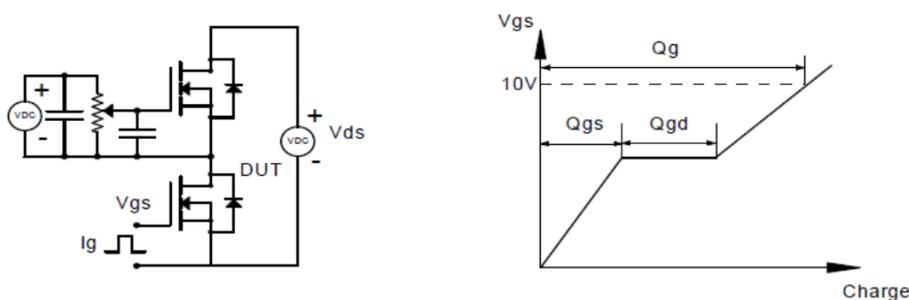
### Switching Time Test Circuit and Waveforms



### Diode Recovery Test Circuit and Waveforms



### Gate Charge Test Circuit and Waveform



### Customer Service

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